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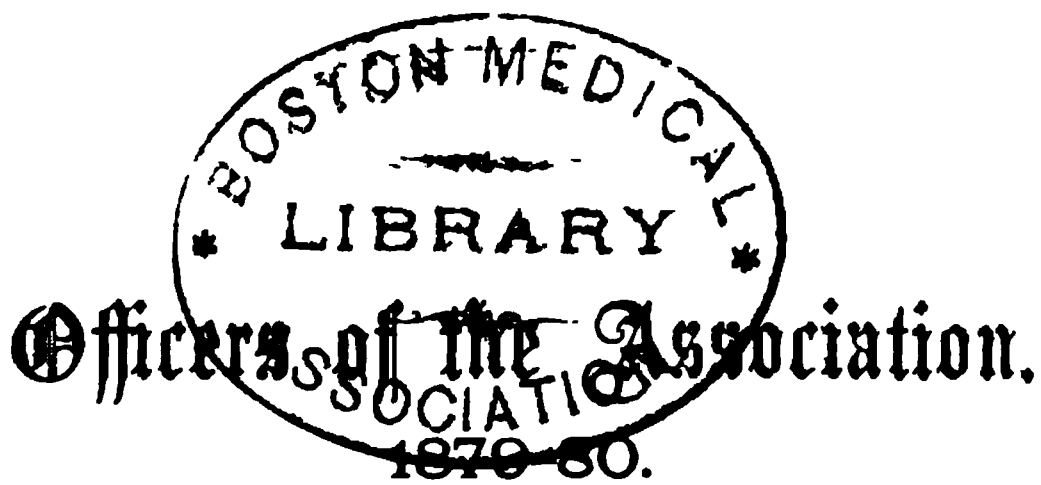
AT THE
Twenty-seventh Annual Meeting,

HELD IN INDIANAPOLIS, IND., SEPTEMBER, 1879,

ALSO THE
BOSTON MEDICAL
LIBRARY
CONSTITUTION, BY-LAWS, AND ROLL OF MEMBERS.



PHILADELPHIA:
SHERMAN & CO., PRINTERS.
1880.



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Ambrose Smith, . . .	Philadelphia, . . .	1858-59
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Peter W. Bedford, . . .	New York, . . .	1860-62
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REPORTER ON PROGRESS OF PHARMACY.

C. L. Diehl, . . .	Louisville, Ky., . . .	1873-80
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AUTHORIZED AGENTS OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.

Appointed by the President, in compliance with the following resolutions:

Resolved, That the President be directed to appoint authorized agents, where needed in the different States, for the collection of dues, distribution of the Proceedings, etc.; such agents to be designated by the Treasurer and Permanent Secretary of the Association, and a list of the agents to be published in the Proceedings. (Passed at Baltimore, 1870.)

Resolved, That the President of this Association be requested to appoint, in every locality where more than three members reside, a local agent, whose duty it shall be to aid the Treasurer in the collection of members' dues in his section, and to procure new members by placing before the pharmacists, and others eligible to membership, the great advantages that they will derive from associating themselves with this body. (Passed at Indianapolis, 1879.)

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LIST OF QUERIES

TO BE ANSWERED AT THE TWENTY-EIGHTH ANNUAL MEETING, 1880, TO BE
HELD AT SARATOGA, NEW YORK.

QUERY 1. Vaseline has, to some extent, taken the place of simple ointment in extemporaneous pharmacy. A preparation of similar character, but of greater consistency, would be a valuable addition to the Pharmacopœia. A working formula with specimens is desirable.

Accepted by W. H. Crawford, St. Louis, Mo.

2. In the preparation of the medicated waters of the Pharmacopœia, Carbonate of Magnesium is generally ordered to be used. Such waters are incompatible with many salts and cause precipitates. Can some insoluble substance be used in place of the Carbonate of Magnesium, which shall answer the like purpose, and not be open to the same or other objections?

Accepted by Robert H. Cowdrey, Chicago, Ill.

3. Acidum Sulphuricum Aromaticum, of the United States Pharmacopœia, upon standing deposits a precipitate. How can this be remedied? Give a working formula, with specimens of the finished product.

Accepted by A. L. Snyder, M D., Bryan, Ohio.

4. Would the substitution of Citrate of Sodium for Citrate of Ammonium in the officinal Pyrophosphate of Iron make the latter less liable to become insoluble on keeping?

Accepted by Charles Caspari, Jr., Baltimore, Md.

5. Tinctura Ferri Chloridi, of the United States Pharmacopœia, frequently lets fall a precipitate. Is this due to the alcoholic strength of the preparation? If the tincture contained less alcohol, and more water, would it be more permanent? Is there any valid objection to such modification of the formula?

Accepted by F. M. Harper, Madison, Ind.

6. When the green root of Cimicifuga is bruised and remains exposed to the air it emits a volatile body which, upon coming in contact with a glass rod moistened with Hydrochloric acid, gives white fumes, indicating Ammonia, what substance in the green root is the source of the exhalation?

Accepted by Professor E. S. Wayne, Cincinnati, Ohio.

7. What is Dextro-quinine? How is it made? What proportion of Quinia, Quinidia, Cinchonia, and Chinoidin does it contain? What is its proven therapeutic value?

Accepted by C. Gilbert Wheeler, Chicago, Ill.

8. The Alkaloid Berberina is by some writers claimed to be nearly insoluble, while others claim it to be freely soluble in water. The properties of the alkaloid should be further investigated.

Accepted by T. L. A. Greve, Cincinnati, Ohio.

9. Cologne water is often prescribed. Should a formula be made officinal? And if so, what formula is best adapted?

Accepted by Charles M. Miller, Mansfield, Ohio.

10. Fruit Syrups. An essay on them, with especial reference to their probable adoption in the next Pharmacopœia.

Accepted by Adolf G. Vogeler, Chicago, Ill.

11. Ointment. The consistence, keeping qualities, etc., of ointments made with lard, are often quite unsatisfactory. Some of the vegetable fixed oils, with wax or spermaceti, are said to produce a more satisfactory basis for ointments. Can such be advantageously substituted for lard in the officinal ointments?

Accepted by J. M. Good, St. Louis, Mo.

12. Rhamnus Purshiana has attracted considerable attention as a purgative remedy. What forms of galenical preparations of it are desirable, and how should they be prepared?

Accepted by George W. Kennedy, Pottsville, Pa.

13. Powdered extracts present some advantages at the dispensing counter. What solid Extracts may advantageously be kept in that form, and how are they best prepared?

Accepted by C. S. Hallberg, Chicago, Ill.

14. Medicinal Soaps are often found of very indifferent quality and composition. Cannot formulas be constructed whereby the officinal soap may be obtained advantageously of uniform quality and composition?

Accepted by George H. Schafer, Fort Madison, Iowa.

15. Peptonized Meat. Several methods for its preparation have been given. How may it be prepared so as to unite stability with medicinal usefulness.

Accepted by C. S. Hallberg, Chicago, Ill.

16. Aspidium Marginale has been found by Mr. C. H. Cressler to be very similar in its medicinal value to the European Aspidium filix mas. Can the rhizomes of the American plant be obtained in quantities, and if so, should the latter not be recognized by our Pharmacopœia in place of filix mas?

Accepted by George W. Kennedy, Pottsville, Pa.

17. Aromatic Spirit of Ammonia has been proposed as a menstruum for exhausting lupulin. Has this any advantage over alcohol?

Accepted by S. L. Coffin, Chicago, Ill.

18. Solvents for Wax, Paraffin, Stearin, Ceresin, as a test for adulteration of wax?

Accepted by P. W. Bedford, New York.

19. On dissolving solids in water, or in other liquids, a change of bulk is generally produced, consisting in nearly every case in an increase of volume. It is desired to work out a table of the changes of bulk produced by dissolving definite quantities of officinal solids in definite quantities of menstrua.

Accepted by P. C. Candidus, Mobile, Ala.

20. What are the advantages and objections to preparing *ferric hydrate* by the use of concentrated solutions of ammonia and ferric sulphate, as compared with the use of diluted solutions, with the special object of employing the ferric hydrate in making the scale salts of iron?

Accepted by Professor G. F. H. Markoe.

21. The Resin of *Leptandra Virginica* (the *Leptandrin* of commerce) varies much in appearance and sensible properties. To what causes are these varying results to be attributed? What is the best process for the preparation of the resin and what is the average yield of the root?

Continued to J. U. Lloyd, Cincinnati, Ohio.

22. An essay on *Gelsemium Sempervirens*, embracing the question as to what principle its activity is due, and whether the green root possesses any advantage over the dry?

Continued to Gust. J. Luhn, Charleston, S. C.

23. Nearly all the Lactic Acid in use in this country is manufactured abroad. Cannot this acid be made as well and as cheaply in this country? Give a formula for its preparation.

Continued to P. J. Schumann, Atlanta, Ga.

24. An examination of the residuum liquid from *Hydrastis Canadensis*, from which *Berberia* has been separated, with a view to establish the identity of the acid with which the alkaloids are naturally combined.

Continued to Emil L. Boerner, Iowa City, Iowa.

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PREFATORY NOTICE.

THE arrangements for the uninterrupted publication of this volume were completed in November, and the first proof-sheet was received November 15th. The causes for the delay are explained on pages 798, 810, and 814, and by the following letter :

INDIANAPOLIS, February 28th, 1880.

PROFESSOR MAISCH.

ESTEEMED FRIEND: Will you do me the favor to withhold from the report of the American Pharmaceutical Association the paper which I read on "The Practice of Medicine and Pharmacy?" As presented it was in the form of hastily prepared, disconnected notes, which it was my intention to revise for the published report, but sickness and pressure of business have rendered such revision impossible.

The subject is worthy of a more careful writing, and, if you will kindly withhold the paper, I promise to rewrite and offer it for publication at as early a date as my time will permit.

Faithfully yours,

HENRY S. WELLCOME.

The bulk of the present volume, as compared with the preceding ones, has been considerably lessened by the selection of a paper which, while equally strong and heavy, like that previously used, is much thinner; the change, it is hoped, will meet the approval of the members.

The publication with the present volume of the portrait of the late Eugene L. Massot is a tribute to the memory of one who has been active for the elevation of pharmacy in the West. A native of Louisville, Ky., Mr. Massot went to St. Louis, Mo., in 1852, where his sterling integrity secured for him the esteem of a large circle of friends. He became a member of this Association in 1857, and interested himself in extending its influence and that of the St. Louis Pharmaceutical Association, from which afterwards the St. Louis College of Pharmacy was organized. The Association having been prevented from meeting in St. Louis in 1861, as contemplated, in 1865, at the meeting in Boston, Mr. Massot strongly urged the claims of St. Louis as the place for holding the meeting in

1866; but the Association resolved to go to Detroit in that year, and when it did meet in St. Louis, in 1871, it was a source of regret that he was no longer among the living. Mr. Massot died February 14th, 1871. His portrait is presented to the Association by a number of his friends.

Most of the woodcuts in this volume have been kindly loaned by the publishers of "New Remedies," by the publishers of the "American Journal of Pharmacy," and by Messrs. Parke, Davis & Co. The remainder were made after illustrations furnished.

The undersigned regret that the discussions have not been reported as fully as usual. This may be in part explained as the fault of the building where the meeting was held, it being often difficult to understand the speakers. Every discussion taken down by the reporter has been printed.

The attention of the members is again directed to the Centennial Fund (see page 809). When it is remembered that the fund is to be permanently invested, and the interest only used to aid in the prosecution of original investigations, which may ultimately prove to be of service to the members generally, it would seem that a much larger amount than is actually required should be contributed.

The price of the Proceedings now on hand, *including postage*, has been fixed as follows :

	Unbound.	Bound.
1851, 1852, 1853, 1854, 1855, . . .	\$0 25	
1857,	50	\$0 75
1858,	1 50	1 75
1859,		1 75
1860,		1 25
1862, 1863,		1 50
1864, 1865, 1866,	1 50	1 80
1867,	2 20	2 50
1868, 1869, 1870,	2 50	3 00
1871,	4 50	5 25
1872,	2 50	3 00
1873, 1874,	5 00	5 50
1875, 1876,	7 00	7 50
1877,	6 00	6 50
1878, 1879,	7 00	7 50

There were no Proceedings published in 1861, and those for 1856 are out of print.

The entire set of bound volumes, the first six in paper covers, will be furnished at \$60 ; and the set of unbound volumes, including the bound ones for 1859, 1860, 1862, and 1863, at \$55. To enable the members who have recently joined the Association to complete their sets, the Executive Committee offer the volumes for 1872 and all the preceding ones bound (as far as on hand) at \$20, and unbound at \$18. These prices are exclusive of postage or express charges.

The Twenty-eighth Annual Meeting will take place at Saratoga Springs, N. Y., on the second Tuesday (14th day) of September next.

GEORGE W. KENNEDY,
Chairman of the Executive Committee, Pottsville, Pa.

JOHN M. MAISCH,
Permanent Secretary, 145 North Tenth Street, Philada.

LIST OF MEMBERS IN ATTENDANCE AT THE TWENTY-SEVENTH ANNUAL MEETING.

J. H. Andrews, Seymour, Ind.	Robt. W. Gardner, Bloomfield, N. J.
W. H. Averill, Frankfort, Ky.	H. D. Garrison, Chicago, Ill.
T. Roberts Baker, Richmond, Va.	Samuel Gerhard, Philadelphia, Pa.
Joseph Bartels, Indianapolis, Ind.	E. A. Gessner, New Haven, Conn.
Jacob Baur, Terre Haute, Ind.	J. M. Good, St. Louis, Mo.
Aug. R. Bayley, Cambridgeport, Mass.	E. Goodman, Cincinnati, Ohio.
Oscar A. Beckman, Louisville, Ky.	C. F. Goodman, Omaha, Neb.
P. W. Bedford, New York, N. Y.	W. J. M. Gordon, Cincinnati, Ohio.
William Blaikie, Utica, N. Y.	F. M. Gray, Hopkinsville, Ky.
Edmund Bocking, Wheeling, W. Va.	T. L. A. Greve, Cincinnati, Ohio.
Emil L. Boerner, Iowa City, Iowa.	Hiram E. Griffith, Niagara Falls, N. Y.
George Buck, Chicago, Ill.	Julius Huag, Indianapolis, Ind.
F. A. Butler, Lowell, Mass.	C. S. N. Hallberg, Chicago, Ill.
J. G. Campbell, Corsicana, Texas.	Chas. W. Hancock, Philadelphia, Pa.
Samuel Campbell, Philadelphia, Pa.	Frank M. Harper, Madison, Ind.
P. C. Candidus, Mobile, Ala.	E. Harvey, Guelph, Ont.
T. J. Casper, Springfield, Ohio.	Charles A. Heinitsh, Lancaster, Pa.
Samuel L. Coffin, Chicago, Ill.	Charles F. Hildreth, Suncook, N. H.
John Colgan, Louisville, Ky.	David Hilt, Lafayette, Ind.
T. P. Cook, Philadelphia, Pa.	Charles Huston, Columbus, Ohio.
W. T. Courtney, Owensboro, Ky.	John Ingalls, Macon, Geo.
Robt. H. Cowdrey, Chicago, Ill.	W. A. Irvin, Kokomo, Ind.
William H. Crawford, St. Louis, Mo.	H. T. Jarrett, New York, N. Y.
Frank A. Davidson, Chicago, Ill.	J. F. Judge, Cincinnati, Ohio.
Vincent Davis, Louisville, Ky.	Jul. Junginann, New York, N. Y.
C. E. De Puy, Chelsea, Mich.	George W. Kennedy, Pottsville, Pa.
C. L. Diehl, Louisville, Ky.	Henry Kielhorn, Indianapolis, Ind.
J. B. Dill, Indianapolis, Ind.	Aug. Knoefel, New Albany, Ind.
E. T. Dobbins, Philadelphia, Pa.	John A. Lambert, Indianapolis, Ind.
Charles L. Eberle, Philadelphia, Pa.	A. S. Lane, Rochester, N. Y.
Albert E. Ebert, Chicago, Ill.	Louis Lehn, New York, N. Y.
A. W. Eckel, Charleston, S. C.	Joseph L. Lemberger, Lebanon, Pa.
George Eger, Cincinnati, Ohio.	Eli Lilly, Indianapolis, Ind.
Joseph S. Evans, West Chester, Pa.	G. J. Luhn, Charleston, S. C.
J. H. Feemster, Cincinnati, Ohio.	Geo. McDonald, Kalamazoo, Mich.
Charles E. Ferris, Lawrenceburg, Ind.	Thomas F. Main, New York, N. Y.
John J. Frost, Lexington, Ky.	John M. Maisch, Philadelphia, Pa.

24 LIST OF MEMBERS AT THE TWENTY-SEVENTH ANNUAL MEETING.

George A. Mangold, Trenton, N. J.	George Ross, Lebanon, Pa.
George F. H. Markoe, Boston, Mass.	Enno Sander, St. Louis, Mo.
H. J. Marshall, Aurora, Ind.	E. H. Sargent, Chicago, Ill.
Emil Martin, Indianapolis, Ind.	William Saunders, London, Ont.
H. J. Menninger, Brooklyn, N. Y.	Geo. H. Schafer, Fort Madison, Ind.
Adolph Metzger, Indianapolis, Ind.	H. J. Schlaepfer, Evansville, Ind.
C. F. G. Meyer, St. Louis, Mo.	George W. Sloan, Indianapolis, Ind.
C. O. Michaelis, Charleston, S. C.	Henry S. Schrader, Indianapolis, Ind.
Adolph W. Miller, Philadelphia, Pa.	A. L. Snyder, Bryan, Ohio.
Charles M. Miller, Mansfield, Ohio.	Chas. C. Spannagel, Philadelphia, Pa.
Wm. G. Mortimer, New York, N. Y.	H. P. Thorn, Medford, N. J.
Louis H. Mueller, Indianapolis, Ind.	Arth. Timberlake, Indianapolis, Ind.
G. A. Newman, Louisville, Ky.	Charles W. Tobey, Troy, Ohio.
Peter Nodler, Covington, Ky.	Charles A. Tufts, Dover, N. H.
Jefferson Oxley, Nicholasville, Ky.	R. H. Venoble, Bardstown, Ky.
Joseph R. Perry, Indianapolis, Ind.	Adolf G. Vogeler, Chicago, Ill.
Edward C. Pfingst, Louisville, Ky.	F. W. Walker, Jr., New Brighton, Pa.
Will. S. Plumer, Jr., St. Louis, Mo.	A. C. Wallace, Bellefontaine, Ohio.
Elisha Post, Athens, N. Y.	M. H. Webb, Simpsonville, Ky.
H. H. Rademaker, Louisville, Ky.	Henry S. Wellcome, New York, N. Y.
Fred. F. Reichenbach, St. Louis, Mo.	J. D. Wells, Cincinnati, Ohio.
Jos. P. Remington, Philadelphia, Pa.	Otto S. Weusthoff, Dayton, Ohio.
J. H. Richardson, Portland, Me.	Thomas Whitfield, Chicago, Ill.
Alonzo Robbins, Philadelphia, Pa.	F. T. Whiting, Grt. Barrington, Mass.
Joseph Roberts, Baltimore, Md.	B. O. Wilson, Boston, Mass.
Wiley Rogers, Louisville, Ky.	N. Wolfe, Wilkesbarre, Pa.

PROCEEDINGS
OF THE
TWENTY-SEVENTH ANNUAL MEETING
OF THE
American Pharmaceutical Association.

REPORT ON THE PROGRESS OF PHARMACY,
FROM JULY 1, 1878, TO JUNE 30, 1879.

BY C. LEWIS DIEHL.

THE period, when the author of this report has so far completed his work as to review the result of his labors during the year, is naturally looked forward to with much pleasure, inasmuch as it promises him a respite, however short it may be, from exertions which are at times quite arduous. Yet, when the time has arrived to form the short introductory for this report, the pleasure is not pure and unalloyed; for, on the one hand, there exists a certain apprehension lest the work intrusted to him should give evidence of greater imperfections than may be allowable, while, on the other hand, the profusion of interesting matter embodied in the report renders a proper selection for a short review quite perplexing. If, therefore, in his present report, the reporter has failed to meet expectations, or if in the following review he has failed to do justice to the importance of the subjects embodied in them, he trusts that the short time allotted to the extraction of the vast quantity of matter supplied, and the impossibility on that account to carefully review and correct what has been written, will serve as valid excuse.

An important omission in last year's report was notice of the fact that the metric system of weights and measures has been adopted by the United States Marine Hospital Service. An order of the late Surgeon-General, John M. Woodworth, dated April

27th, 1878, provides that after that date medical officers of the Marine Hospital Service shall make use of the metric system of weights and measures for all medical and pharmacal purposes: the terms gram, centigram, and cubic-centimeter to be used for expressing all values. It may not be generally known that the metric system has long been in use by that service, under the act of July 28th, 1866, for purveying medical supplies, and that consequently the various subordinates in that service are well prepared to work under the new system of notation. Simple rules for the ready conversion of terms of the United States apothecaries' weights and measures into their respective equivalents in metric terms, suggestions as to the mode in which metric medical prescriptions may be constructed, and a very complete posological table, all of which have been prepared by Professor Oscar Oldberg, accompany the Surgeon-General's order, which, being the first decided step towards the universal adoption of the metric system in this country, will be hailed with satisfaction by the friends of that system, foremost among which we must count the pharmaceutic profession. A systematic effort to popularize the metric system is being made by the so-called "Metric Bureau," a society having its headquarters at Boston. This society is sending out a variety of cards and circulars containing all needful information regarding this system, and has prepared what it calls "wooden missionaries," in the shape of rules or decimeters, joined together in tenfold pocket meter rules, made of common wood, to be supplied to schools at a cost of a few cents each. It cannot be denied, however, that there are those who do not favor the general introduction of the metric system. This is particularly true of the general trade, to which, except perhaps as regards imports, the metric system presents many disadvantages. Mr. T. F. Brownell, in "Popular Science Monthly," says on this subject: "Ten is, theoretically, ill suited for the radix system of notation, because it permits of only one bisection. The half of it is five, an odd number. It also is incapable of any other division. On account of these defects the system is ill adapted to the operations of the shop and market." "In all departments of trade the current prices have been derived from a process of successive halvings. The shopman reckons by halves, quarters, eighths, sixteenths, and thirty-seconds." "Almost the entire price list of our stores advances and recedes by these fractions of a unit formed by successive bisections. The attempts of the French to compel

the use of the decimal system shows the difficulty of such an undertaking. Popular necessities compelled the introduction of binal divisions. The prices of their money and stock markets are still frequently quoted in quarters and eighths. The attempt to divide time decimally was a failure. After trying to give to their decimal metrology a universal application, they have been compelled to modify it in many of their weights and measures. From the inherent defects of a ten scale, all attempts to introduce an international decimal system of weights and measures have met with strong opposition." But notwithstanding opposition of the character quoted, the decimal metric system slowly but surely makes its way. From a statistical table recently constructed by Malarcé, it appears that the decimal system of weights and measures is now established legally and obligatory in eighteen states, comprising a population of over 236,000,000, viz., France and colonies, Belgium, Holland and colonies, Germany, Sweden, Norway, Austria-Hungary, Italy, Spain, Portugal, Roumania, Greece, Brazil, Columbia, Ecuador, Peru, Chili, and the Argentine Republic. It is made legally optional in three States, having a population of over 76,000,000, viz., England, Canada, and the United States. It is admitted in principle, or partially for customs, in five States, with over 343,000,000 of inhabitants, viz., British India, Russia, Turkey, Venezuela, and Hungary, making a total of twenty-six states, with 655,000,000 of inhabitants, in which the system is recognized legally or in principle. But besides these there are four states, with 471,000,000 of inhabitants, viz., Switzerland, Mexico, Japan, and China, which also have a decimal system as to multiples and divisions, but which is not based upon the meter as unit. It appears from this, then, that in 1878 more than half the population of the civilized states, comprising 1,180,000,000 inhabitants, legally recognize a decimal system of weights and measures. Several interesting communications on material for constructing standard weights and measures, and on methods of taking specific gravities are noted. Professor F. Mohr proposes glass containing a large proportion of silica as material for weights. In reference to the weighings themselves, he remarks that in analytical weighings too little attention has hitherto been given to barometric and thermometric influences. Against the consequences resulting from this neglect the best weights are no protection. A fall of the barometer of 10 mm., which may occur in one day, will render a kilogram of rock

crystal lighter by 5.3 milligrams. What is the use, therefore, Professor Mohr asks, of adjusting a standard kilogram to the decimal of a milligram if the barometer and thermometer can bring about such changes? The production of the alloy—iridio-platinum—for the construction of the international standards of weights and measures by the French government, has been intrusted to Messrs. Jonhuson & Matthey, of London. Mr. George Matthey, a member of this firm, has contributed an interesting paper in which he details the methods of purification of the metals, as well as that used in the final production of the alloy. The proportion of iridium in the alloy to be used is ten per cent., but Mr. Matthey is of the opinion that for standard rules, which are constructed in the tube-form, an alloy containing fifteen per cent. of iridium is more suitable, while for the weights one containing twenty per cent. should be employed. The characters which have led to the adoption of iridio-platinum for the construction of these standards are the following:

It is almost indestructible; has extreme rigidity, especially in the tube-form; a most beautiful polished surface may be imparted to it; its coefficient of elasticity is very great, and its high density (21.5 for the ten per cent. alloy) is a valuable quality for standard weights.

A simple device for taking the specific gravity of liquids is that recommended by Gannal, who has constructed little instruments, shaped like an olive, which will displace accurately ten or one hundred cc. of the liquid. By immersing one of these, suspended from the scale-pan, in a liquid, the weight required to restore the previous equilibrium at once gives the specific gravity. Dr. Hager gives a very simple method of determining the specific gravities of solid fats—a process which is ordinarily attended with much difficulty. The fat is melted and carefully dropped into alcohol or diluted alcohol, in which it is again allowed to congeal. The congealed drops are then transferred to a second vessel containing a liquid the density of which is increased or decreased by the addition of alcohol, water, or glycerin, until the fat shows a tendency to float, but does not rise or sink at once. The specific gravity of the liquid then is that of the fat.

During the past several years the production of emulsions by the venders of “elegant pharmaceutical preparations” has been a source of much profit to them. How much of this is due to the slipshod manner in which this class of preparations is often

dispensed it is difficult to say, though much of the demand is doubtless due to the enterprise of the manufacturer. Quite a number of papers on the subject of emulsions were extracted for last year's report, and among those that have been communicated this year that of Mr. William Gilmour deserves particular attention, since he accomplishes emulsification with a minimal quantity of gum. Three drachms of gum tragacanth, three ounces of glycerin, and from eight to ten ounces of water, will perfectly emulsify, if the author's directions are carefully followed, from fifty to eighty ounces of cod-liver oil, the latter quantity forming, in his opinion, a better emulsion than the former. And while on the subject of cod-liver oil it is of interest to learn, from a paper of Dr. E. T. Blackwell, that iodized cod-liver oil can conveniently be prepared by taking advantage of the solubility of iodine in oil of bitter almonds. When iodine is macerated for a rather long period—one or two months—in this essential oil a solution containing twenty-five per cent. of iodine is readily obtained, and if of such a solution fifteen grains are added to one pint of cod-liver oil, the resulting preparation not only contains a proper medicinal dose of iodine in perfect solution, but it also contains the medicinal and flavoring effect of the essential oil of almonds, both of which may be regarded as advantageous adjuncts to the remedy. The subject of fluid extracts has not elicited as many papers during the past year as the near approach of the decennial revision of our national Pharmacopœia might have led us to expect. A very thorough paper, however, has been contributed by Mr. Alonzo Robbins, who experimented with senna and senega, and has arrived at results which lead him to recommend repercolation, modified in certain particulars, for the preparation of fluid extracts in general.

Dialyzed iron, which last year was the subject of numerous papers, has again drawn quite a number, but the present papers treat particularly of improved methods and apparatus, speculations as to its character and composition being no longer necessary. Mr. G. H. Charles Klie recommends a piece of parchment-paper, folded at an angle of 60° , which is introduced into a porcelain filtering-basket, this in its turn is adjusted into a glass percolator of suitable size. When in use the percolator is filled with water from above, and the water withdrawn from time to time, as may be necessary, by the removal of the cork beneath. Particular attention is directed to the character of the parch-

ment-paper, a light but perfect quality being most suitable, since it dialyzes most rapidly. A very useful suggestion is that of Mr. E. Lebaigne, who recommends a series of funnels, united with each other by bent tubes extending from the lower orifice of one into the top of the next. These are provided with plaited parchment filters, thereby securing a large dialyzing surface, and the water is changed in them every twelve hours by allowing sufficient distilled water to flow into the first funnel to replace its own contents, an additional dialyzer being added at one end, while, after a certain time, one is removed at the other. Thus the water used for the first dialyzer of the series serves in succession for the dialysis of all the members of the set, making the process continuous and economical. A method for constructing a parchment-paper dialyzer in form of a bag, the seams of which are rendered impervious by means of chromo-glue, is given by Huizinga, while Schneider gives a process for, and Jackson communicates some experiments on dialyzed iron.

Professor Emlen Painter, describes a new form of suppository mould, which is constructed on the principle of Remington's pill-press. The suppository mass is made cold with powdered cacao-fat and the medicinal agent, rolled out into a cylinder, which is divided into a suitable number of pieces and these then shaped by pressure in the mould. The method appears calculated to secure handsome suppositories, uniform in composition and strength. A more complicated apparatus, but one in which the suppository mass is also worked cold, is that devised by Mr. H. C. Archibald, and described by Evan T. Ellis, and which deserves attention, as does also an apparatus for making compressed pills, designed by Mr. Bennet L. Smedley. Besides these points of special importance numerous others might be mentioned under the heading of pharmacy, but sufficient has been said to show that this portion of the report presents the usual array of interesting information.

Materia Medica has been enriched by numerous papers, many of which are of high importance. Some of the subjects under this head might with propriety be considered under the head of pharmacy or organic chemistry; but such an arrangement would have been inconvenient, inasmuch as it would have necessitated a division of subjects closely related to each other. Indeed, as it is, much of the matter now considered under organic chemistry might more conveniently be considered under the drugs to which

it is related. A pharmacognostic system, arranged in conformity with that of Professor R. Buchheim, described in the body of this report, would seem to be admirably adapted, and would very much simplify the arrangement of the report. Professor Dymock's interesting "Notes on Indian Drugs" have been continued during the year, and, as heretofore, extracted. While much of what is embraced by these notes is not new in the strict acceptation of that term, being often extracts mainly from Indian and other Oriental medical works, it must be new to the great majority of European and American readers, and therefore deserves more than passing attention. A very interesting contribution to *Materia Medica*, also, is that of Dr. Edward Palmer on the "Plants used by the Indians of the United States," which has been very completely extracted for the report. The present paper is complementary and supplementary to Dr. Palmer's former paper in the "Report of the Department of Agriculture" for 1870, and embraces all the additional matter that has since come under his observation. The genus "*Berberis*" has in recent years attracted much attention on account of the reputed virtues of some of its species growing in the territory bordering on the Pacific. Much confusion, however, appears to exist in reference to the identification of species, many of them being called indiscriminately "Oregon grape" on account of their globular dark-blue berries. Professor Maisch has contributed a paper on this genus, in which the various species indigenous to the United States are described, and which will doubtless serve a good purpose in identifying the species having medicinal repute. Some members of the genus "*Drosera*," commonly called "sun-dews," have again attracted attention on account of their reputed value as a remedy in phthisis. Mr. Pierre Vigier has contributed an interesting historical sketch of *Drosera rotundifolia* and *Drosera longifolia*, both of which appear to have been used as early as the sixteenth century as remedies for consumption. The observations of Dr. Currie seem to indicate some value if the remedy is persistently applied in cases of phthisis presenting symptoms of bronchitis, but that it fails in most of the ordinary cases. Mr. Vigier gives formulas for some galenical preparations, and Mr. G. Lugan has made an analysis of the round-leaved variety, whereby he proves the presence of a crystallizable acid, peculiar to the plant, and, contradictory to the observations of Reiss and Mill, the absence of formic acid in the viscous exudation of the glandular hairs of the plant.

Several members of the genus "*Duboisia*" continue to attract attention. The close analogy of the medicinal characters of *Duboisia myoporoides* to those of belladonna have attracted prominent attention to this plant, the botanical characters of which are now given by Professor De Lanessau. It is, however, difficult to classify this genus; for while Endlicher places it in the order of Scrophulariaceæ, Bentham and Hooker place it amongst the Solanaceæ, and excellent reasons may be advanced for each classification. In last year's report the experiments of Mr. A. W. Gerrard and of Mr. A. Pettit, showing the presence of an alkaloid in this plant, were detailed. Their observations seemed to indicate a close analogy of this alkaloid, which Mr. Pettit had named "*duboisina*," to atropia. Experiments since made by Mr. F. von Müller and Mr. L. Rummel seem to prove, however, that the alkaloid is volatile, that it resembles in most of its characters nicotia, and that it is probably identical with the "*piturina*" obtained by Staiger from the Australian drug known as pitury, and which has since been proved to be the product of another species of *Duboisia*, namely *Duboisia Hopwoodii*. Indeed, Mr. A. Pettit, who, as well as Mr. Gerrard, has obtained the volatile alkaloid from pitury, asserts positively that it is identical with nicotia. An interesting paper on the subject of pitury, which seems to be pronounced "*pitch'ery*" by the natives of Australia, has also been contributed by Mr. P. Murray, late surgeon of the Victoria Contingent Search Expedition into Central Australia, who gives an account of the uses to which this Australian rival of coca is applied by the natives, the customs attending its use on certain occasions, etc. *Rhamnus Purshiana*, which under the name of "*Cascara sagrada*" has acquired some notoriety, has been subjected to chemical and microscopical analysis by Professor Albert B. Prescott. The more important constituents are a light-yellow resin, or neutral body, and a crystalline principle, which deserve further examination. A paper by Mr. W. B. Rush on the various members of the Citrus family, which are cultivated or grow in the United States, also deserves more than passing attention, since it points out to the American pharmacist the possibility of producing profitably in this country many of the products of that family that are now exclusively imported. An important paper is that of Dr. Theo. Peckolt on *Myroxylon peruiferum*, Lin., two instalments of which have appeared up to the date of this report. The paper gives the result of chemical investigation made upon

various parts of this valuable tree, which, indigenous to Peru, Southern Mexico, Bolivia, and Western Brazil, is also met with in the forests of the province of Rio de Janeiro, where Dr. Peckolt has had opportunity to become familiar with it. Dr. Peckolt has also communicated the results of an analysis of the leaves of *Sparattosperma leucantha*, Mart., which have powerful diuretic properties, and, in his opinion, deserve to be introduced into European medicine. The diuretic effect of the leaves appears to be due mainly, if not exclusively, to a neutral crystalline principle, *sparattospermin*, which is completely described. An account of the method of collecting rubber in the provinces of Para and Ceara, and the islands that are scattered over the lower portion of the Amazon, as described by Mr. Robert Cross, who has made a number of trips to South America for the purpose of securing seeds and plants of the best rubber-producing trees, with a view to their introduction in India, will be read with profit. Mr. Cross has also had opportunity to observe the collection of copaiba in the valley of the Amazon, which, though attended with extreme hardships, is very profitable to the collector.

The cinchonas have, as usual, been the subject of numerous experiments. A historical review of the cultivation of cinchonas is given in *Druggists' Circular*, which embodies in a concise form much that has appeared in previous reports. The writer observes that the supposition that the valuable cinchonas, in South America, would soon be exhausted, has been proved by late researches to be groundless, since now and immense forests have been opened in Bolivia and New Granada. A concise account of the distribution of cinchonas in South America is given by Mr. G. Roessing, who also believes the plants to exist in great abundance, but in districts which are at present practically inaccessible, and will continue so until the numerous tributaries of the Amazon shall be opened to commerce. Analyses made of twenty-seven Bolivian cinchonas, by Professor W. Stoecker, also show that the supplies of valuable barks from that country are by no means exhausted. The collection of these barks has been made by Mr. E. Schukraft, consul for the Netherlands to Bolivia, and it is particularly important because it has been possible, for the first time, to subject Calisaya bark, the origin of which is positively known, to chemical analysis. Highly interesting, in a pharmaceutical aspect, are some experiments by Mr. Charles Ekin on the comparative strength of

various preparations made from the same cinchona bark, such as tincture, infusion, decoction, and fluid extract, the results of which point to alcohol as the proper menstruum for the extraction of the bark. Regarding cinchona alkaloids, a number of important papers have been contributed. Schrage has repeated his experiments upon the microscopic reaction of sulphocyanide of potassium with the cinchona alkaloids, communicated in 1874, including in the present experiments also cinchonidia, and has obtained results in the main confirmatory of those previously recorded. Dr. O. Hesse, who had previously expressed the opinion that Schrage's microscopic test for the cinchona alkaloids is not to be recommended, and gave unsatisfactory results, has also repeated his experiments, and while he still maintains his former position, he now admits that it may be made available for both cinchonidia and quinia within certain limits and under certain conditions. Dr. Hesse also communicates ready and certain tests for the determination of the purity of quinia and quinidia salts, which are particularly suited to pharmacists. Dr. Skraup, as the result of careful experiments on the composition, products of oxidation, etc., of cinchonia, finds that when perfectly pure it has the composition $C_{19}H_{27}N_2O$, and that commercial cinchonia salts always contain a second base, which adheres to them tenaciously, and which is identical with the hydrocinchonia of Caven-tou and Willin. Inasmuch as the production of this second alkaloid has no connection with the cinchonia derivatives produced by hydration, Dr. Skraup prefers to call it "cinchotina." A second alkaloid, also hitherto not noticed, is by Drygin said to accompany the commercial salts of quinia. It was eliminated during the preparation of a new double salt—the muriate of quinia and urea—which the author finds to be exceedingly soluble in water, and therefore considers particularly useful for hypodermic use. The new alkaloid, which Mr. Drygin has named "cinchonichin," remains in the mother liquors from which the double salt has been crystallized, exists to the amount of six per cent. in the commercial sulphate, and less in the muriate and other salts of quinia, and possesses characters which clearly distinguish it from the other cinchona alkaloids.

From the reports of British consuls in China it appears that though the cultivation of the poppy is prohibited by the Chinese Government, the prohibition is regarded as a dead letter, and large quantities of opium are produced in some districts, while

the cultivation is carried on in many more with greater or less success. A paper of Mr. B. S. Proctor gives some interesting notes on opium and the various galenical preparations made from it, as well as on morphimetric tests. On the latter subject Mr. A. Pettit also makes some observations, and gives a method which rapidly leads to accurate determinations of the morphia percentage in opium. A series of important comparative experiments upon the reactions of iodic acid, sulphomolybdic acid, and ferric chloride, with morphia, and the reactions produced by the same reagents in grape-juice, orange-juice, saliva, etc., have been made by Mr. David Brown, and merit the attention of analysts.

Messrs. C. R. Alder Wright and A. P. Luff have continued their experiments upon the aconite alkaloids, which have been referred to in several reports preceding this. Their results are in the main confirmatory of previously recorded results. In reference to "pseudaconia," however, which is the product of the saponification of pseudaconitia, the principal alkaloid of *A. ferox*, the authors find that they were in error in their report of last year, and that the substance then described as pseudaconia is in reality a dehydrated derivative of that substance, which they have named "apopseudaconia." The authors maintain that there is no longer any excuse for the employment of the crude aconitia of commerce, which is in the main pseudaconitia containing more or less amorphous and less active bases, because they have shown that the crystallized nitrate of pseudaconitia can be readily prepared from the commercial aconitia by taking advantage of its sparing solubility in dilute nitric acid. Regarding aconitia from *A. napellus* the same strictures are made, since this is so readily obtained in crystals from ether that its preparation free from amorphous alkaloids is a matter of great ease. Some experiments have also been made upon the alkaloids of Japanese aconite root, by which they have obtained clear evidence of the presence of a crystallizable alkaloid, which differs both from aconitia and pseudaconitia. It likewise appears to be distinct from that obtained last year from the same aconite roots by Messrs. Paul and Kingzett, but their experiments are yet too incomplete for its exact characterization. An important contribution also is that of Dr. Dunnin von Wasowicz on *A. heterophyllum*, Wall., to which attention has been drawn on account of its reputation in India as an antiperiodic, and from which Broughton, in 1874, had obtained a peculiar non-poisonous alka-

loid—atesin. Dr. von Wasowicz has also obtained this alkaloid, for which he finds characters and composition very closely conforming to those found by Broughton. He gives a very careful description of the plant, and particularly of the root, together with the results of his very complete chemical examination of the same, from which it appears that a second alkaloid is probably contained in it. When, in 1875, Professor Attfield announced as the result of his investigations that "goa-powder" was largely composed of chrysophanic acid, his results were generally accepted as correct. It seems now, however, that he was mistaken in so far as he assumed the existence of that acid in the goa-powder as such. C. Liebermann and P. Seidler have found that instead of chrysophanic acid that powder contains a peculiar neutral substance, which they have named chrysarobin, but which by the action of solution of potassa with access of air is readily converted into chrysophanic acid. It is unfortunate, however, that these authors have selected the name "chrysarobin" for the new substance, since Mr. David Kemp, in 1875, had already proposed that name for goa-powder itself.

A new rhubarb, obtained from a plant which Professor Baillon has recognized to be a variety of *R. hybridum*, and named *R. Colinianum*, has been found by Mr. Colin, of Verdun, to have the characters of pretty good rhubarb. Mr. Chauveau considers this plant to be the source of Chinese rhubarb, and the observation seems to sustain the opinion expressed by Professor Baillon, in 1876, that Chinese rhubarb is probably obtained from several species. In 1875 Mr. Husson had expressed the opinion, based upon the absorption of iodine by infusions of rhubarb, "that the greater the quantity of iodine absorbed without change of color taking place the more certain we can be of having before us a rhubarb of first quality." Mr. Henry G. Greenish has now undertaken a series of experiments to determine the value of Mr. Husson's observation, and has arrived at the conclusion, based upon a very thorough analysis of the various samples of rhubarb experimented with, "that the quantity of iodine absorbed by a sample of rhubarb cannot be regarded as indicating its quality, and that this quantity absorbed does not depend for its absorption on the active ingredients alone." In a subsequent paper Mr. Greenish records the analyses of four samples of rhubarb, which lead to some very interesting comparisons.

In what has been said in the foregoing much has been drawn

from the section "Organic Chemistry," and while much more could be mentioned that is of special interest, it is believed that the foregoing gives a fair insight into the character of the report now presented, which, in all its divisions, will be found a very fair record of pharmaceutic progress during the year.

PHARMACY.

A. APPARATUS AND MANIPULATIONS.

Weights, Measures, and Specific Gravity.

Metric Weights and Measures—Adoption by the United States Marine Hospital Service.—One of the most important acts in the latter part of Surgeon-General J. M. Woodworth's life was doubtless his order, dated April 27th, 1878, and approved by the Secretary of the Treasury, requiring medical officers of the United States Marine Hospital Service thereafter to make use of the metric system of weights and measures for all official medical and pharmacal purposes. The order specifies that in expressing quantities by weight the terms "gram" and "centigram," and in expressing quantities by volume the term "cubic centimeter" only shall be used. The order is accompanied by rules for the ready conversion of terms of the United States apothecaries' weights and measures into their respective equivalents in metric terms, suggestions for writing metric prescriptions, etc., and a metric posological table, which have been prepared by Professor Oscar Oldberg, Chief Clerk and Acting Medical Purveyor United States Marine Hospital Service. These rules, etc., give evidence of great care and completeness, and if in the hands of medical practitioners and pharmacists generally, would give a very material impulse toward the general adoption of the metric system of weights in medicine. As it is, the action of the Treasury Department in this connection must be regarded as the first practical step to the adoption of the metric system of measurements for all purposes whatever throughout the land.

The Metric System.—Among the resolutions passed by the International Congress on Weights, Measures, and Coins, which was brought to a close in Paris, in October, 1878, is one deploring

that England, Russia, and the United States still hold aloof from the metric system, and expressing an opinion that the governments of these countries should be solicited to "give effect as early as possible to an act of progress so eminently useful to science, commerce, and international relations," as the adoption of the metric system would be.—Ph. Jour. Trans., Oct. 5th, 1878, p. 262.

Material for Standard Weights and Measures.—Professor F. Mohr proposes glass containing a large proportion of silica as material for weights. He remarks that the only men of science who work with good balances and accurate weights are the chemists, and hitherto none of them has considered it necessary in his weighing operations to consult the barometer and thermometer except as regards the gases. In one and the same set of weights are to be found pieces of brass and of platinum, and the same weights are used, for instance in Munich, at the height of 1700 feet, and in London at slight elevations above the sea level. Against the consequences of these fallacies the best weights are no protection, and we may say that this source of error has been neglected in all chemical discoveries. We must easily see that it is unjustifiable to weigh finer than to milligrams in all cases where a platinum crucible is concerned, or the ash of a filter, or glass vessels holding a considerable volume of air, or precipitates not absolutely insoluble. The substance we are in search of is, moreover, rarely weighed, as is silica or alumina, for instance, but it is generally calculated from some compound, and this introduces the further uncertainty of the atomic weights which are brought to a round number, as in the case of phosphorus, sodium, calcium, magnesium, etc. It may be said that the whole structure of organic chemistry has been erected with a false atomic weight for carbon, which is even yet uncertain. A fall of the barometer of ten mm., which may occur in one day, will render a kilo weight of rock crystal lighter by 5.3 milligrams. What is the use, therefore, of adjusting a standard kilo to the decimal of a milligram if the barometer and thermometer can bring about such changes? Weights of crystal and of platinum are not commensurable unless the atmospheric pressure is taken into account.*—Liebig's Annal., v. 194, No. 1, in Ch. News, November 15th, 1878, p. 243.

* Mr. Crookes, the editor of "Chemical News," draws attention to his "Researches on the Atomic Weight of Thallium" as an instance of a

Determination of Specific Gravities.—W. A. Tilden recommends that in publishing results, chemists should in all cases mention the experimental data from which the specific gravity is to be calculated, or at least the method of calculation. A great deal of trouble in the way of recalculation would be saved if some uniform procedure were generally adopted. At the present time the very common practice in determining the specific gravity of a liquid is to weigh the liquid and the water successively in the same vessel at the same temperature. This plan recommends itself on the score of simplicity, but it has one disadvantage, that if the specific gravity has been determined at two or more temperatures, the numbers so obtained are not available without correction for the calculation of the coefficient of expansion of the liquid. The author prefers to proceed thus: Fill the specific gravity bottle or tube with water, carefully adjusting the temperature to 4° (39.2° F.), weigh with proper precautions, and record the result once for all. This gives not only the weight of water at 4°, but also the capacity of the vessel in cubic centimeters. From this the capacity at any other temperature can be calculated by the well-known formula $V = v(1 + kt)$. The coefficient of expansion of glass, k , may be taken as 0.000026; t is the difference of temperature from 4°. A table of values can thus be drawn up and kept with the specific gravity bottle. In conclusion the author mentions that, except for rough purposes, he has discarded all sp. gr. bottles as completely unmanageable. The use of Sprengel's tube (described in J. Chem. Soc. (2), 8, p. 577) has given much better results.—Ch. News, 38, p. 300; in J. Chem. Soc. Mch. 1879, p. 197.

Simple Method of Taking Specific Gravities.—Mr. Gannal has recently devised a useful and ingenious apparatus, made in the form of an *olive*, so that bubbles of air shall not attach themselves to its sides, whereby the sp. gr. of liquids, whether lighter or heavier than water, syrupy or thin liquid, may be taken with the greatest facility. The olive, whether made of glass or metal, has a volume exactly equal to one decimal division of a cubic meter; the instruments constructed by Mr. Gannal being 100 and 10 cubic centimeters. Inasmuch as these will respectively displace 100, and 10 cc. of a liquid into which they are suspended from a

chemical investigation where the influence of the barometric pressure was taken into account in the operation of weighing.

balance, the sp. gravity can at once be read off by the weight required to restore equilibrium.—Drug. Circ., April, 1879, p. 75; from *Les Mondes*.

New Specific Gravity Balance.—Mr. L. Reinman, of Berlin, has constructed a new specific gravity balance on the principle of that of Mohr-Westphal (see Proceedings, 1877, p. 34), which is shown by Fig. 1. It consists of a base, an upright pillar carrying

FIG. 1.

Specific Gravity Balance.

the vernier, and a beam, one arm of which is divided into 10 equal parts, from the last of which the accompanying float is to be suspended. The other parts are a cylindrical jar, with a loose wooden base for holding the liquid to be examined, the float, em-

bracing a thermometer, and the weights. The float, including platinum wire, has a weight of exactly 10 grams, and displaces 5 grams of water at 15°C. ($=59^{\circ}\text{F.}$). Hence the unit of weight is 5 grams; the other weights (riders) 0.5, 0.05, and 0.005 gram. When using the balance the float is suspended from the end of the long arm, and exact equilibrium is established by means of the screws at the end of the short arm. Whenever the index points to the exact centre of the vernier, the largest rider is affixed to the point where the float is suspended, and the latter is immersed in distilled water at 15°C. ($=59^{\circ}\text{F.}$), until the equilibrium is again restored. The point up to which the float with its suspended wire is immersed, under these conditions, is exactly marked, as in all future experiments with other liquids the float must be immersed to the same depth. The twisted loop of the platinum wire at the upper end of the float must be fully immersed. Another rider of the same weight, which is also furnished, is now suspended in place of the former, when, if both are identical in weight, the same point of immersion must be reached. Each of these riders weighing 5 grams, the two when suspended in air together in place of the float, should maintain the equilibrium previously established with the latter. When examining a liquid *lighter* than water, and the float has been immersed, one of the large (5-gram) riders is placed on one of the notches of the long arm so that the balance stands poised. But if, to produce this effect, the rider would have to be placed between any of the notches, it is placed over the next inner one, and the equilibrium is adjusted by the next smaller rider in succession, as may be necessary. Thus, if the 5-gram rider is on notch 8, the 0.5-gram rider on notch 7, and the 0.05-gram rider on notch 3, the sp. gr. of the liquid would be 0.873; and a fourth rider (0.005-gram) would, if necessary to equilibrium, give the fourth decimal figure. If the liquid to be examined is *heavier* than water, one of the 5-gram riders is suspended from the 10th notch, at the extremity of the beam, and represents 1000. The further manipulation is the same as in the former case.—New Rem., November, 1878, p. 322.

MECHANICAL DIVISION, SOLUTION, PERCOLATION, ETC.

A New Drug Mill.—The firm of W. Schröder & Co., machinists, of Leipsic, have placed on the market a series of new drug mills (see Fig. 2), which are stated to have some decided advan-

tages over those commonly in use at the present time. The grinding surface consists of two well-hardened geared cylinders, one large and one small, which have sharp oblique ridges by which the grinding is performed. These may be set at any de-

FIG. 2.

Drug Mill.

sired distance by means of screws. The hopper is of sheet iron, and contains an attachment kept in motion during the grinding, whereby the substance in the same is constantly shaken up and fed regularly to the cylinders. The mills may be taken to pieces without difficulty, but under ordinary circumstances this is unnecessary, as the hopper is hinged and may be turned to one side, thus exposing the cylinders. The larger sizes are also provided with belt and fly-wheels. For producing very fine powders extra cylinders are supplied, which are less deeply and much more finely grooved than the others. Those who have used these mills speak very favorably of them.—*New Rem.*, November, 1878, p. 336.

An Efficient Drug Press.—Charles T. George criticises the various forms of drug presses in use, and gives the preference to the horizontal double-screw press known as Mohr's. This, nevertheless, is not free from objection, and he has therefore had one constructed in which these objections are overcome. The apparatus, which is a modification of Mohr's (see Fig. 3), is described by the author as follows:

"The *first part* consists of a strong substantial framework

made of ashwood, $1\frac{1}{2}$ inches square, 32 inches long, 26 inches wide, and 25 inches high, forming the base or table upon which the press moves. The *second part* consists of two pieces of timber, resting upon this frame, each of which is 28 inches in length, 9 inches high, and 6 inches wide, one firmly attached by iron rod

FIG. 3.



Drug Press.

and keepers to one end of the frame or table, and the other one free or movable, both blocks at same distance from end being bored with smooth holes to receive the two iron screws. Upon the movable block, and opposite the holes, a female nut of bell-metal is firmly fixed. Upon the inner face of these two timber

blocks an iron casting, saddle-shaped and hollow, is inserted flush or even with the face of the block, the height and width of which is 12 inches, and the diameter 3 inches; the thickness of the iron crust being $\frac{3}{4}$ inch leaves a cavity of $1\frac{1}{2}$ inch diameter, or capable of holding 6 pints of boiling water each, each casting having a hole on top to receive hot water or steam, and to discharge the chilled water at bottom a brass pet-cock is fixed. The two iron screws are 32 inches long and 2 inches in diameter, and of course pass through both blocks of timber; the head of each screw has an iron cog-wheel, 16 inches in diameter, attached; into the cogs of both wheels a 4-inch pinion-wheel is neatly and firmly fixed, which in turn is fastened to a short shaft having at its end an iron fly or lever wheel, 22 inches in diameter, with handle."

By the turning of this wheel both screws are evenly and rapidly turned without danger of bending or breaking. The hot-water arrangement enables the application of the machine to the expression of fixed oil, and the power is sufficient to express, for instance, three ounces of oil from one pound of linseed meal without any great muscular effort on the part of the operator. Two saddle-shaped poplar boards are used to cover the iron castings when wanted to express other than oily or fatty preparations. There is no patent on this press, and the author very generously invites others to make unlimited use of his experience. The simplicity of structure, cheapness, cleanliness, and great power of this press recommend it to the attention of pharmacists.—A. J. Ph., September, 1878, pp. 417–420.

Filtering Apparatus.—The apparatus illustrated by Fig. 4 is designed for filtering turbid liquids which it is desired to keep from contact with air, particularly such as wines and fermentable fluids, and is said to answer a good purpose. A flask or bottle with rather wide neck is fitted with a cork bearing two glass tubes, one of which projects a distance below the cork, and the free end of which passes through another smaller cork, while the second tube only just reaches to the lower surface. A linen bag, made by sewing a strip of linen $1\frac{1}{2}$ –3 feet long and $2\frac{1}{4}$ to $3\frac{1}{4}$ inches wide, is slipped with one end over the small cork at the end of the longer tube and tied; the other end of the bag is either sewed up or tied with a string. Previously, however, the bag is wetted with the liquid to be filtered, and partly filled with some of the turbid liquid mixed with coarse animal charcoal. It is then introduced into the flask, and the latter

corked as shown in the cut. By connecting the vessel containing the turbid liquid with the bottle and filtering-bag by means of the flexible rubber tube, the liquid to be filtered flows by its own pressure into the bag, and is forced through its pores into the flask, whence it flows through the shorter tube into the receiver placed at a lower level. The cork used for closing the flask should be very sound; a rubber stopper is perhaps preferable. There are several advantages connected with this apparatus. In the first place, the

FIG. 4.

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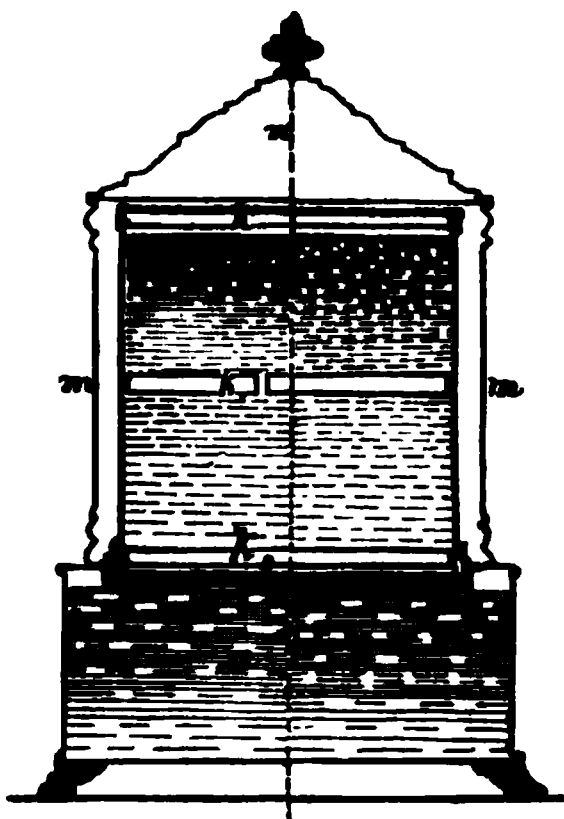
Filtering Apparatus.

flow of liquid may be retarded or accelerated by using longer bags, and placing the flask at a lower level. The flow may be at any moment suspended by the aid of a pinch-cock. The filter bags are easily cleaned and there is scarcely any loss. Should a particular liquid not pass clear through a single bag, a second bag, slipped over the first, will generally overcome the difficulty.—*New Rem.*, December, 1878, p. 357; from "Die Weinlaube," No. 17.

New Filtering Apparatus.—Mr. Franz Holzinger has con-

structed a new filtering apparatus which is illustrated by Fig. 5.

FIG. 5.



Holzinger's Filtering Apparatus.

Its principal advantage is the arrangement of the filtering medium, the sides as well as the bottom being lined with filtering-paper. The apparatus consists of a receptacle, *a*, to receive the filtrate, being a square box made of tinned iron or other suitable material; it has a round opening in the top, into which the filter proper fits. The first piece fitting into this opening is a ring, intended to hold in place the next following parts, and perforated with holes for the passage of the filtrate. Next follows a very shallow circular dish with a narrow rim, provided all over with numerous holes. A piece of circular filtering-paper, cut exactly, is laid on the perforated bottom of this dish. The real filter is the circular case or drum, *m*, open below and above, and really consisting of two separate parts, namely: an outer jacket, *m*, and an inner drum, perforated with numerous holes. The diameter of the drum is such that it will fit nicely into the shallow perforated dish. A piece of filtering-paper is now spread snugly over the inner surface of this drum, taking care that the paper projects about an inch over the lower rim. The paper is pressed against the sides of the drum, and held in place by the three spring-hoops, *k*, *k*₁, *k*₂. The projecting edge of the paper is now clipped down to the rim in about half a dozen places, and turned back over the rim. It is then inserted, with the rim downwards, into the shallow dish, where it forms, after moistening, a tight joint. There remains nothing but to fill the drum with the liquid to be filtered, which will pass quite freely and clear through the paper.—*New Rem.*, November, 1878, p. 331; from *Neueste Erfind. u. Erfahr.* 1878, p. 385.

Rapid Filtration.—Dr. Ebermayer reports that he has found muslin, which is folded in shape of a filter and placed below the latter, to be an excellent promoter of rapid filtration. He had occasion to make use of such additional muslin filters for the purpose of removing the paper filters from the funnel without tearing; and he thereby had opportunity to notice this useful

property of the additional muslin filter.—New Rem , March, 1879, p. 84; from Drog. Zeit.

A New Filtering Funnel (Fig. 6) is described by a recent writer in "Scientific American," and is recommended on account of its inexpensive character, and the ease with which it may be cleaned and managed. An ordinary tin funnel has an upright band about

FIG. 6.

Filtering Funnel.

one inch wide soldered to its upper edge. A tin can of almost any capacity, without a bottom, and a trifle smaller than the top of the funnel, is also provided. Over the lower end of this can a piece of linen, muslin, or wire-gauze is to be placed, and the end of the can, so covered, is then forced into the top of the funnel. The can is best provided with a lid to keep out the dust, etc.—New Rem., April, 1879, p. 115.

Method for the Separation of Precipitates in Quantitative Analysis.—Mr. F. A. Gooch recommends a method for the ready separation of precipitates by means of a felt of anhydrous asbestos. This material is capable of filtering liquids with rapidity and efficiency; it is light, compact, incombustible at the highest temperatures used in analytical processes, not affected by acids

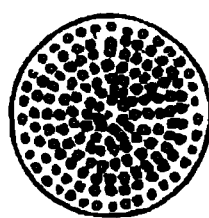
(except hydrofluoric), or alkalies; it is sufficiently coherent to resist entirely the disintegrating action of a liquid forced through it under the pressure of a Bunsen pump, and may be prepared by a simple process, which is described by the author as follows: White, silky, anhydrous asbestos is scraped to a fine short down with an ordinary knife-blade, boiled with hydrochloric acid to remove traces of iron or other soluble matter, and washed by decantation. A platinum crucible of ordinary size, preferably of the broad, low pattern (Fig. 7) is chosen, and the bottom (Fig. 8)

FIG. 7.



Platinum Crucible.

FIG. 8.



Perforated Bottom of Crucible.

perforated with numerous fine holes, or, better still, the bottom may be made of fine platinum gauze. Next a Bunsen funnel of the proper size is selected, and over the top a short piece of rubber tubing is stretched and drawn down till the portion above the funnel arranges itself at right angles to the direction of the stem. Within the opening in the rubber the perforated crucible is fitted as shown in Fig. 9, and the funnel is connected with the receiver of a Bunsen pump or other exhausting apparatus. To make the asbestos felt the pressure of the pump is applied, and a little asbestos prepared as described, and suspended in water, is poured into the crucible; the water is drawn through, and the asbestos is deposited almost instantly in a close, compact layer, upon the perforated bottom; more asbestos in suspension being poured upon the first, until a sufficiently thick layer is obtained. Finally, a little distilled water is drawn through the apparatus to wash away any filaments that may cling to the under-side. To prepare the filter for the estimation of a precipitate, the crucible with the felt undisturbed is ignited and weighed. The precipitate is then collected, washed, ignited, and weighed in a manner that readily suggests itself; observing, however, in case a very high temperature must be employed, to inclose the perforated crucible within another to avoid loss by the curling up of the edges of the asbestos felt at very high temperature, and the consequent dropping through the perforations of a portion of the

precipitate. When turbid liquids are to be filtered, or gelatinous precipitates to be separated, instead of the perforated crucible the author prefers to use a platinum cone (Figs. 10 and 11), the upper part of which is of foil, the lower of gauze; the method of covering with asbestos felt being identical with that described

FIG. 9.

FIG. 11.

FIG. 10.

Platinum Cone.

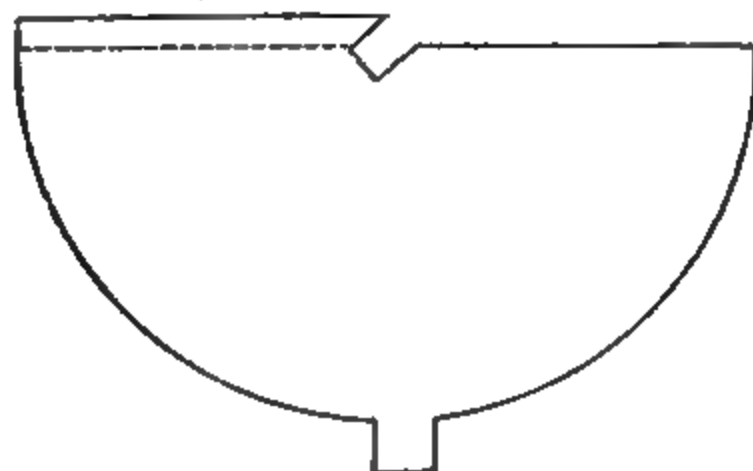
Funnel with Perforated Crucible.

Funnel with Platinum Cone.

above. Further details particularly relating to special applications of the method are given, and may be consulted in "New Rem.," October, 1878, pp. 290, 291.

Platinum Cone Filters for Rapid Filtration.—Referring to Mr.

FIG. 12.



Platinum Foil for Cone.

Gooch's method of preparing asbestos filters as above described, Mr. Henry B. Parsons states that he has found a finely-perforated

platinum cone, which, when spread out, has the shape illustrated by Fig. 12, to answer the purpose admirably. The little projection on the cone, which is cut out of a piece of foil, is convenient for handling with the forceps. In making the cone it is best to pierce it with pinholes from *without*, and before folding the edges together. The cone works well when fitted into a 60° funnel by aid of one or two wetted filter-papers, which are placed between it and the funnel. He has found moderately coarse acid washed asbestos better than that which is very fine.—*New Rem.*, March, 1879, p. 77.

Rapid Drying of Filters.—Mr. Thomas Austen recommends for this purpose *infusorial earth*. If a wet filter be laid upon a thin layer of this material it will be found to have lost its moisture in an incredibly short time. The material is far superior to porous tiles, besides being ~~more easily~~ restored to its dry condition by ignition. In case it is important to prevent the adhesion of any foreign particles to the filter to be dried, the latter may be laid upon a ~~second~~ larger piece of filtering-paper before being laid on the earth.—*New Rem.*, October, 1878, p. 305; from *Ch. News*.

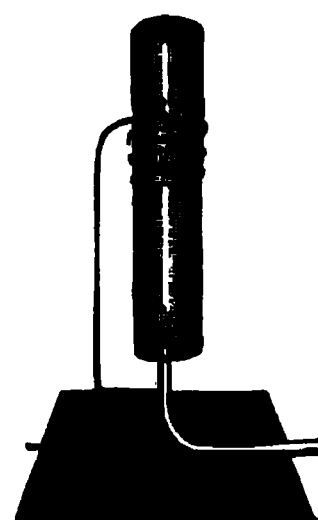
APPLICATION OF HEAT, VAPORIZATION, ETC.

Thermometers — Historical.—It seems to be now well established that Galileo was the original discoverer of thermometers (1596). His thermometer was, according to P. G. Tait, an air thermometer composed of a ball and tube, the latter dipping into a liquid. It was first employed to measure the temperature of sick persons, the ball being for this purpose introduced into the patient's mouth. Similar in construction was the subsequent thermometer of Sagredo, which was also used for the same purpose. Rinieri (died 1647) was the first to construct thermometers containing liquids hermetically sealed. Some of these thermometers were found in 1829 by Antinori, which made it possible to explain some of the published observations of Rinieri. It was with these thermometers that the Florentine Academy found, among other observations, that the melting of ice always took place at the same temperature. Newton (*Philosophical Transactions* for 1701) proposed the melting temperature of ice and the boiling-point of water as normal temperatures, and it was in 1714

that Fahrenheit, in Dantzic, produced the first thermometer with uniform divisions.—Ph. Centralh , August 29th, 1879, p. 335.

Bunsen's Burner.—Simple Construction.—In the report for 1878 (p. 68) a description and illustration of a very simple and easily made Bunsen's burner, devised by Mr. P. Ebell, was given. Since then a still more simple contrivance has been made known by Mr. Rud. Biedermann. A large cork is divided by a horizontal section into two halves. Into the lower half is cut a gutter for the reception of a gas-tube. The upper half is perforated in the centre to allow the upright end of the gas-tube to pass out. Both sections of the cork are then joined with glue or sealing-wax. A tube of hard glass is then fixed over it in the manner shown in the cut (Fig. 13) by attaching it to a wire, which is spirally wound around it, and one end of which is fastened in the cork. By raising or lowering the glass tube the flame may be made larger or smaller. The burner may be steadied by attaching a piece of lead to the cork.—N. Rem., July, 1878, p. 203; from Dingl. Pol. Jour.

FIG. 13.



A simple Bunsen's Burner.

Distillatory Apparatus.—Professor J. P. Remington has improved the still described in January, 1878 (see Proceedings, 1878, p. 71), so as to accommodate its size to the wants of small operations and in other directions. The improved apparatus, capacity about three and a half gallons, is illustrated by Fig. 14. The body of the still is of planished copper, cylindrical, and has a double thick copper bottom; a glass gauge-tube is arranged on the side to show the height of the liquid. The dome has been entirely altered, the opening to permit the escape of vapor being at one side and shaped so as to afford as little condensing surface as possible, and is connected with the condenser by a ground joint slightly tapered, thus forming a perfectly tight connection without the use of lute. The condenser does not differ in principle from the one previously described, but its construction and proportions have been simplified. By arranging a syphon, joined to a piece of rubber tube, as shown in the cut, and this compressed with one of Squibb's screw pinch-cocks to adjust the flow of the liquid, it is possible to use this still for much larger

quantities of liquid than three gallons. One gallon of alcohol may be recovered from weak percolates easily in forty minutes. —A. J. Pb., May, 1879, p. 225.

FIG. 14.

Pharmaceutical Still.

Water-bath with Constant Level.—Mr. M. Benjamin recommends the following construction of the water-bath, whereby a constant level of the water may be secured: A large vessel (a common glass bottle will answer) is filled with water, and placed on a shelf or support above the bath.



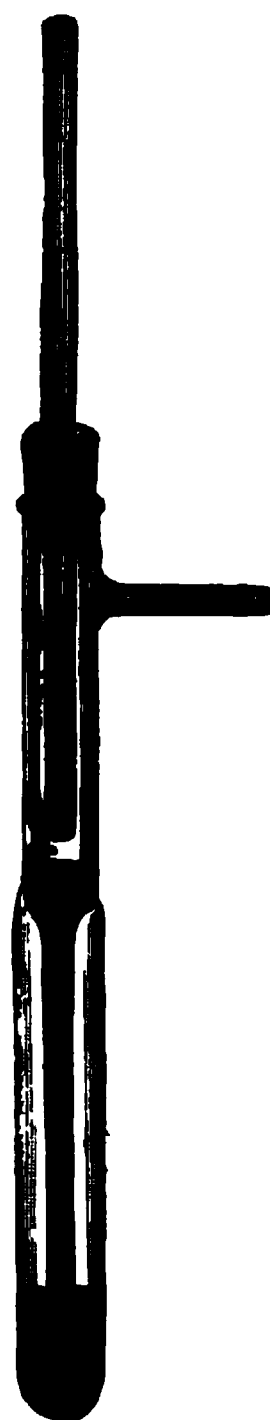
Improved Water-bath.

The water flows through a piece of rubber hose to the large glass tube on the right of the drawing (Fig. 15); running down this tube it passes to the bath through the copper tube connected with the bottom of the bath. Within this glass tube is a smaller one, which is on an exact level with the top of the water-bath, through which any excess of water passes away and falls to the ground. The flow of water from

the bottle can easily be regulated by means of an ordinary pinch-cock.—Ch. News, April 10th, 1879, p. 160.

A New Gas Valve for Regulating the Temperature of Water-baths, etc., is constructed by Mr. H. Weinhausen. A glass tube is provided with a diaphragm (Fig. 16), from the centre of which a smaller tube extends nearly to the bottom of the larger one. Near the top of the large tube is a side connection for attachment of a gas-tube, and through a tightly-fitting cork a third tube is inserted. Near the lower end of the latter tube is drilled a small hole, as shown in the figure. The cork and tube being removed, *clean mercury* is to be poured into the larger tube until it rises above the lower end of the smaller tube, and the air in the lower part of the larger tube is compressed until the mercury is sustained above the diaphragm, as represented. The lower end is then immersed in the water-bath; the tube passing through the cork is connected with a Bunsen burner under the bath and the gas turned on. When the temperature of the bath has reached the proper point the tube is pushed down through the cork until its lower end just touches the mercury. The little hole in the side of this tube then allows enough gas to pass to the burner to keep it alight. When the temperature of the bath falls, and the mercury and air in the bottom of the tube have contracted, the lower end of the tube is uncovered, and again permits a free flow of gas until the temperature has again risen to the fixed limit.—New Rem., April, 1879, p. 110.

FIG. 16.



Gas Valve.

Drying Closet.—Mr. T. Edward Greenish draws attention to a drying closet for a small pharmaceutical laboratory. It was adapted by him to a recess in the wall, the dimensions of which were fixed, but he considers the size to be well adapted. Fig. 18 is a front view of the drying closet with the door open. Fig. 17 is a transverse vertical section of the same. *A* is a recess in the wall; *B* is the drying closet, made of thin sheet iron, and provided with wire shelves, *C*, and a door, *D*. The closet is made of such a size

that when fixed into the recess in the wall a space of about two inches is left at the back, sides, bottom, and top, the space being covered in front by the flanges, *a a*, formed in the front of the closet. *E* is a gas burner, supplied from the pipe *E*, and *F F* are two air-pipes which enter at the bottom of the closet *B*; these pipes draw their supply of air *external* to the laboratory, and their upper ends are surrounded by a layer of sand, forming a sand-bath two inches deep. The gas being lighted is supplied

FIG. 17.

FIG. 18.

Drying Closet and Section.

with air from the front, and the heated air together with the products of combustion pass round the closet through openings, made for that purpose, in the sides and back of the gas-chamber, up the space between the closet and the wall to a pipe, *G*, and thence to a chimney.

The articles to be dried or evaporated are placed either upon the shelves or upon the sand-bath. The air which enters by the pipes *F F*, slightly warmed by the sand, will carry up any vapor

therefrom to a pipe, *H*, at the top of the closet, and thence to the pipe *G*. In order to regulate the draft of air at the back and sides of the closet, and thereby to adjust the degree of heat, the pipe *G* is provided with a circular damper, and the gas-chamber also has in front of it an arrangement for regulating the supply of air to the gas, thus preventing sudden fluctuation of temperature. By these means the heat of the closet may be adjusted to the greatest nicety. The temperature of each of the four shelves differs; if, for instance, the one at the top is 82° , the second will be 85° , the third 88° and the lower one 92° , whilst the sand-bath will show about 130° , F.—Ph. J. Trans., August 3d, 1878, p. 81.

Drying Closet.—A handy substitute for a drying closet, which can be applied wherever there is a stove, consists of a long-legged, skeleton shelving, made of thick iron wire, which is put astride the stove so as not to touch it. Whatever small things are wanted to be dried are put on loose trays, which are placed at different heights over the hot stove.—“Random Notes,” in Drug. Circ., April, 1879, p. 79.

Platinum Crucibles, etc.—Mending.—Mr. Thomas Garside has succeeded in perfectly mending a platinum dish by the process of “welding,” as follows: A mould of the dish having been made of plaster of Paris, the dish was inverted over it, a piece of thin platinum foil, cut of suitable size, and this, as well as the part of the dish where the hole was, was rubbed with sea sand until perfectly bright and clean. The platinum foil was laid over the hole and the flame from a table blowpipe directed upon the spot; a pair of scissors, served as a hammer, and by gently tapping with these the two pieces of platinum united perfectly and made so neat a joint that one would scarcely observe it unless one’s attention was called to it. The dish has since been used for all kinds of purposes, but the union is as good as ever. In this operation the plaster of Paris mould, although very dry, was split and cracked by the heat in all directions; nevertheless, it had sufficient cohesion to last until the operation was concluded. Platinum wires are very easily joined in this way.—Ch. News, August 9th, 1878, p. 65.

Temper of Glass Vessels—Spontaneous Explosion.—Mr. J. Laurent draws attention to the following circumstance: A capsule of a medium size was in use in the laboratory of M. F. Fournier, at

Marseilles, and was employed, along with porcelain capsules, in determining the moisture of fatty substances. After being in use for a month it was one day heated to 110°C. ($= 230^{\circ}\text{F.}$) over a gas-stove, and kept at that temperature till its contents ceased to bubble. When cool enough to be handled it was transferred to the pan of a balance, but on touching the metal it burst with explosive violence, and its contents were projected to a distance. The operator was fortunately on his guard and escaped with some slight burns. The author asks what would have been the result if the capsule had contained an acid or a concentrated alkaline solution?—Mon. Scient. Quesn., August, 1878, in Ch. News, September 13th, 1878, p. 141.

Mr. F. Martial, of Ploermel, has met with a similar experience. He had placed a few grams of sulphate of potassium with water in a capsule of this material, and, having set it upon his work-table, turned away to light a lamp, when the capsule burst into fragments, with an explosion comparable to that of a fulminate. He then put the same quantity of sulphate of potassium and of water in another capsule of similar material, and succeeded in getting it to boil without accident.—Les Mondes, November 21st, 1878, in Chem. News, December 13th, 1878, p. 288.

Cellulose Rings for Tightening Joints.—The machine-paper factory of Aschaffenburg, manufactures from so-called cellulose (wood-fibre prepared by chemical agents for the manufacture of paper) an excellent pasteboard, which, when cut into rings and disks, affords a valuable material for tightening the joints of machines, boilers, tube systems, and vessels of all kinds. The material is said to replace vulcanized rubber perfectly, and being very much cheaper appears to be destined to supersede the latter to a great extent.—Ph. Centralh., August 8th, 1878, p. 301.

GENERAL LABORATORY OPERATIONS, ETC.

New Apparatus Stand.—Mr. Alonzo Robbins describes a new apparatus stand which possesses the merit of compactness and general utility, and is particularly serviceable in small shops in which economy of space is an object. The semicircular table is 65 inches long, 28 inches wide in the centre, and 33 inches high. The various parts will be readily understood by the illustration

(Fig. 19), and require no further explanation except the clamp, which is the most important part. This (see Fig. 20) is made of

FIG. 19.



Apparatus Stand.

brass, 2 inches long, $1\frac{1}{2}$ inch wide, and $1\frac{1}{2}$ inch high, with $\frac{1}{4}$ inch elevation opposite the slot. The slot is just large enough to allow the clamp to be slipped on the iron rods; the clamp also contains smaller holes, bored all the way through, for the stems of the rings and the small ends of the rods. It is held firmly in place by means of thumb screws.—A.

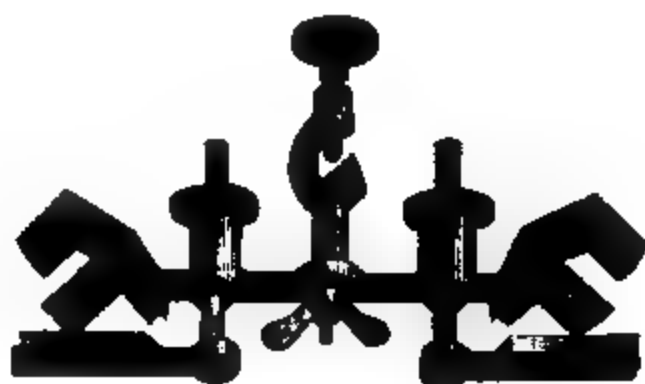
J. Ph., February, 1879, p. 72.

Improved Minim Pipette.—Mr. Charles W. Drew recommends the form of pipette illustrated by Fig. 21, which has some obvious advantages over those ordinarily in use. The pipette, *b*, is surrounded at its upper half by the glass tube, *a*, which is partially closed at its upper end by means of the blowpipe-flame and fitted tightly to the pipette by means of the soft rubber tubing, *c*.

FIG. 21.

FIG. 22.

FIG. 23.



Double Clamp.

Single Clamp.

Measuring
Pipette.

In order to fill the pipette, force it upward to the partially closed end of the telescoping tube, place the point beneath the surface of the liquid, close the open end of the telescoping tube with the finger, and gently raise the outer tube. The liquid is sucked upward, may be raised and held at any level within the pipette, and is forced out

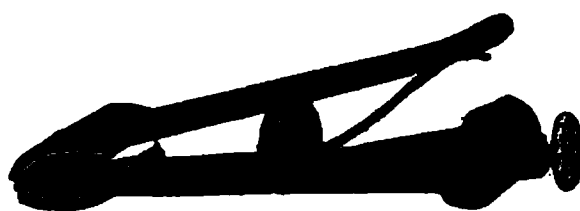
by pressing the outer tube downward or by removing the finger. The principle involved in the instrument is essentially that of the syringe, the rubber tube answering to the air-tight piston. If desired, the upper end of the outer tube may be entirely closed. Similar pipettes have been used by Dr. Squibb.—A. J. Ph. March, April, 1879.

Parallel Clamps.—Mr. Robert Muencke has lately devised an improved clamp, in which the two opposite arms always retain their relative positions. The clamps in common use for holding retorts, flasks, or other apparatus are so constructed that by opening or shutting them the two opposite arms describe more or less of an angle, because they are generally hinged at their point

of contact. This defect is overcome by the new clamp, which is illustrated in single and double form by Figs. 22 and 23. One arm of the single clamp (Fig. 22), which consists of two parallel pieces continuous with the bearing-rod, is provided with an addition carrying a screw-pin, which is attached at its other end to the movable arm. The distance between the two sets of arms is simply regulated by the circular nut, which also serves to retain the two arms firmly fixed. In Fig. 22 it will be noticed that the movable arm is angular, while in Fig. 23 the movable arms are straight, which is perhaps preferable in many instances, as it requires less labor to remove a piece of apparatus from its grasp. The manner of using the double clamp is precisely the same as in the former case.—New Rem., February, 1879, p. 38.

Improved Burette Clamp.—Mr. M. Benjamin has devised an improved form of burette clamp, which is illustrated by Fig. 24.

FIG. 24.



Burette Clamp.

It consists of two arms, one of which is fixed, while the other is held in position by means of a joint, and is controlled by a spring, so that it acts as a lever, and by pressure it may be opened to any desired width. The end of the clamp is provided with rubber cushions, so as to hold a glass burette, or perhaps a funnel, which is placed between its arms. The clamp is made to slide on the upright of a common retort stand.—Ch. News, April 10th, 1879, p. 160.

Flint-glass Shop Bottles—Action of Moderately Alkaline Salts and Alkaline Carbonates.—H. Frickhinger has observed that some of his shop bottles, of hard Bohemian glass, which have been in use for the past forty years, have become quite opaque from the action of certain mildly alkaline salts. He attributes this action to the presence of moisture along with the faint alkalinity of the compound; such action, however slow and feeble, having been continuous because of the omission to wash them out from time to time as they were refilled. The substances which were found to exercise solvent action upon the glass under the conditions named, besides the caustic alkalies, were crystallized car-

bonate of sodium, bicarbonate of potassium, and caustic magnesia; the latter, probably, owing to the presence of a small quantity of alkali. Bicarbonate of sodium had no effect upon the glass. The bottle containing carbonate of potassium was affected only around the stopper, while the body of the glass remained perfectly bright; a circumstance which speaks for the advantage to periodically wash the bottles containing dry alkaline salts as in this case.—Arch. J. Ph., Feb., 1879, p. 136.

A New Test-paper.—Lacour, an army pharmacien, prepares a new and very sensitive test-paper, as follows: Rhubarb is treated with double its weight of liquid ammonia, whereby a magnificent red-purple is developed. After a quarter of an hour the liquid is separated by filtering, and strips of filtering-paper dipped into it are then dried. Under the influence of acids the paper becomes lemon-yellow, and with alkalies it regains its former color.—Drug. Circ., February, 1878, p. 45; from Recueil de Méd. Mil.

Coloring Matter for Microscopic Objects.—G. Boericke recommends *perosmic acid* in conjunction with oxalic acid for imparting color to microscopic objects. If small pieces of tissue or sections of fresh or recently-dried preparations are immersed for an hour in a 1 per cent. solution of perosmic acid, then carefully washed to remove excess of acid, and immersed for twenty-four hours in a saturated solution of oxalic acid (1.15), peculiar colorations will be observed when examined microscopically in water or in glycerin. Certain animal substances are not colored at all, or but faintly, while some show a light carmine-red, others a dark-carmine color, and yet others show a more or less wine-red color; indeed, each formation in the field shows a different tint. Another series of tissues, tested in the same manner, shows more or less dark-yellow, yellow-brown to inky-black coloration.—Ph. Centralh. February 20th, 1879, p. 79; see also Chem. Centralh. No. 1, 1879.

Solutio Malassez.—Dr. Vulpius communicates the following formula for this solution, which is used in the microscopic examination of blood. Having the specific gravity of the latter it enables the counting of the blood corpuscles when it is mixed with it:

Mucilago gummi Arabici,	3.75
Natrii sulfurici,	1.875
Natrii chlorati,	1.03
Aq. destill. q. s. ad pondo tot.,	100.00

The liquor must be filtered and prepared fresh for use, as it does not keep well.—Schweiz. Wochenschr. f. Ph., March 7th, 1879, p. 87.

Saline Compounds—Production of Regular Crystals of any Desirable Size.—Mr. Ferdinand Meyer communicates the following method for producing crystals of desirable size and regular shape: The solution of the desired salt is evaporated to such concentration that after 24 hours' rest a portion of the salt will crystallize. A number of the crystals are then selected, placed upon a glass plate which is contained in a high vessel; a portion of the remaining crystallized salt is then dissolved in a small portion of the saturated solution by the aid of heat; this solution is added to the whole liquid, and the mixture is then poured over the crystals on the glass plate, the vessel being situated where the temperature is uniform, preferably in the cellar. This procedure is repeated every 12–14 hours, the crystals being turned from time to time when the solution is being changed, thereby securing their regular development, until they have attained the desired size. As the crystals become large, particular attention must be given to their proper position upon the glass plate, so as to prevent their undue development in one direction; any adhering imperfections must also be removed each time the solution is changed, particularly if the solution operated with is somewhat concentrated. When the crystals have attained the desired size, it is advisable to place them into a somewhat less concentrated solution, and to allow them to remain in a situation where the temperature will become spontaneously lower, whereby they attain smoothness, sharply-defined edges, and finish.—Arch. f. Ph., October, 1878, p. 342.

Mr. Charles W. Quin remarks in reference to large crystal-growing, that at one time he gave considerable attention to this subject, and found the greatest difficulty in guarding against sudden rises in temperature, which generally had the effect of causing the growing crystal to be partially and unevenly redissolved. To obtain a continually even temperature, after many experiments he hit upon the plan of plunging the beaker containing the growing crystal into the house cistern, the temperature of the water in which never differed by more than 0.5° F. either way, day or night. To prevent the solution from becoming exhausted too rapidly he immersed in it to the depth of half an inch or so a crystal drainer containing a filter-paper full of the salt to be crystallized, so that a constant stream of strong solution was continually descending on the growing crystal.—Ch. News, March 14th, 1879, p. 110.

Paste.—The following formula and process for making paste for

ordinary store use is recommended by Mr. J. B. Moore, and has been found by him to answer all requirements: Tragacanth (contused), 1 oz. troy; gum arabic (contused), 1 oz. troy; carbolic acid (Calvert's No. 1, liquefied according to the directions on the label), 1 fluid drachm; boiling water, a sufficient quantity. To three pints of boiling water in a suitable bottle, graduated to four pints, add the tragacanth and gum arabic; shake well, and set aside in a warm place to macerate from twenty-four to forty-eight hours, shaking well frequently during the process; then strain forcibly through close muslin. Return the strained mixture to the bottle, add the carbolic acid, shake well, and add sufficient boiling water to make the measure of four pints. Again shake well, when the paste is ready for use.—Drug. Cir., October, 1878, p. 165.

Durable Paste—Max Regensberg recommends the following method for preventing mucilage, starch-paste, glue, or gelatin solutions from spoiling: Any of these solutions or pastes, which should have been prepared with hot rain or distilled water, are mixed with a few drops of ordinary commercial silicate of sodium, two to three drops for every fluid ounce. The preservative having been added, the mixture is well stirred with a wooden spatula. A solution which has already commenced to decompose may be restored by heating it strongly and adding four or five drops of the silicate of sodium to every fluid ounce.—New Rem., March, 1879, p. 84; from Drog. Zeit.

Cement for Iron.—A strong cement for iron is obtained by mixing three parts common salt, one part powdered sulphur, and thirty parts iron-filings (or better, the so-called ferri limatura), and formed into a paste with dilute sulphuric acid (eight parts water, six parts sulphuric acid). It is applied to the part, free from rust, and becomes hard in one or two days.—Ph. Centralh., December 26th, 1878.

Cement for Kerosene Lamps.—The following is highly recommended, having great adhesive power, being impermeable to kerosene, a slow conductor of heat, and only superficially affected by hot water: Three parts of resin, one part of caustic soda, and five parts of water; this composition is mixed with half its weight of plaster of Paris. It sets firmly in about three-quarters of an hour. Plaster of Paris alone, which is commonly used to fasten the tops into kerosene lamps, is porous and absorbs the fluid.—New Rem., September, 1878, p. 285.

Cement for Sealing Bottles, etc.—Mix three parts of resin, one part of caustic soda, and five parts of water. This is then to be mixed with half its weight of plaster of Paris. The compound sets in three-quarters of an hour, adheres strongly, is not permeable like plaster alone, and is affected but slightly by warm water.—*Drug. Circ.*, February, 1879, p. 52.

B. PREPARATIONS.

AQUÆ.

Bitter-almond Water—Preparation.—H. C. Vielhaber recommends the following method whereby he obtains a more satisfactory yield of bitter-almond water (Ph. Germ.) than is usually obtained by following the officinal directions. He finds it, moreover, advantageous to operate with at least 10 lbs. of bitter almonds. The almonds are pounded as fine as possible, and the oil, amounting to 36 to 38 per cent., is expressed. The press cake is then reduced to a very fine powder, and it is distilled in quantities corresponding to 2 lbs. of the original almonds with the pharmacopœial quantities of water (using distilled water in case the water is not very soft), and the usual precautions. The first 500 grams of distillate are set aside, the distillation is continued as long as the distillate has the odor or taste of hydrocyanic acid, and this second distillate, generally amounting to several pounds, is used for distilling a second batch corresponding to two pounds, from which 500 grams of the first distillate are again reserved, etc.; this procedure being continued until all the almond powder has been consumed. From 10 lbs. of bitter almonds about 5 lbs. of first and 9 to 10 lbs. of second distillate are obtained by this method. To the first distillate the necessary quantity of spirit (one-fourth its weight) is added. The quantity of hydrocyanic acid is then determined in both distillates, and by calculation it is then easy to determine how much of the second distillate and of alcohol must be added to the first to reduce its strength to that required by the Ph. Germ. The author has generally been able to use all of the second distillate for this purpose when operating with 10 or 12 lbs. of almonds.—*Arch. d. Ph.*, May, 1879, p. 409.

Orange-flower Water—Trade, Uses, etc., in Greece.—Prof. X. Landerer writes, that while oranges are universally sought after

and used during the hottest months of the year in Greece, speculators generally succeed in clearing the market of its stock before the real season begins, when they gradually dispose of their accumulated stock at an immense profit. Oranges may be kept without spoiling for three or four months, by burying them in dry sand in deep, cool cellars.

Many hundred flasks of orange-flower water, *anthoneron*, prepared from the flower of *Citrus aurantium* and *C. medica* are annually exported from Chios to Europe. Those who distil the so-called mastix-raki (raki-brandy), or mastix-rosoglio, prepare also the anthoneron. When the flowers run short, the fresh leaf-tips are had recourse to, and the product then goes by the name of *mytoneron*. If a few drops of fresh oil of neroli are added to the last-named water it cannot be distinguished from genuine orange-flower water. The Jews in Salonica, who number 40,000, and who make it a business to adulterate and imitate Oriental products, make a spurious orange-flower water by impregnating salt or sea water with oil of neroli, which is then sold by the retailers in the Orient in small flasks covered with wicker-work, and is exported to the most distant regions in Asia Minor. The women use it as an antispasmodic remedy. Both kinds of water may of course be distinguished by careful analysis, but the best practical test is the odor and flavor.—New Rem., May, 1879, p. 135.

Orange-flower Water—Reaction with Nitric Acid.—R. Reynolds and C. H. Bothamley, having their attention drawn to a peculiar pinkish hue acquired by a mixture containing orange-flower water and nitro-muriatic acid, have made some experiments by which they prove this reaction to be due to a reaction between the oil contained in the orange-flower water and nitric acid. By suitable means (agitation of the water with absolute ether and careful evaporation of the latter) they succeeded in separating from orange-flower water 0.71 per cent. of volatile oil of a deliciously fragrant odor, the reaction of which with nitric acid of normal strength, 63 grams to liter, may be described as crimson-red; that with orange-flower water being faint red. In contradiction to the observations of Ader, who also observed the red color produced by nitric acid, the authors find that both pure sulphuric acid and hydrochloric acid produce a rose color with orange-flower water; both reactions being, however, much less marked. Ader had found that the water becomes rose-colored only if the

sulphuric acid contained nitric acid, and that hydrochloric acid produced no color at all.—Yearbook of Pharmacy, 1878, p. 583.

Distilled Rose-water.—Mr. A. F. W. Neynaber criticises the various methods that have been suggested for the preparation of rose-water, both with and without resorting to distillation. He prefers the method of distilling oil of rose and water together, but finds that unless the rapid volatilization of the oil is prevented the greater part of the oil distils over with the first portion of distillate, and the water becomes correspondingly weaker. But if the oil is mixed with chalk, or wrapped up in cotton or linen, the quick distillation of the oil will be prevented, and so much of the oil retained that at the close of the operation enough oil will be in the still to impregnate the last distillate with oil of rose sufficiently to make it equal in strength to the first obtained. If the still contains ten gallons of water, the oil should be added through the tube of the still in portions sufficient for about one gallon at a time. When one gallon has distilled, another quantity of oil mixed as described can be added through the tube. With a still of one and a half gallon capacity, one gallon of distillate can be drawn off eight or ten times a day, replenishing after each distillation with one gallon of water and about 16 drops of the best oil of rose.—Drug. Circ., February, 1879, p. 42.

Iodized Water.—Dr. E. T. Blackwell recommends a dilute solution of iodine prepared as follows :*

R. Iodized Glycerin,	3j.
Water,	Oj. M.

This contains about 2 grains of iodine, and may be given in doses of a tablespoonful, corresponding to about $\frac{1}{16}$ grain of iodine and $\frac{1}{2}$ grain oil of bitter almonds.—Ph. J. Trans., November 2d, 1878, p. 349.

CATAPLASMATA.

Poultices.—Dr. T. Lander Brunton makes the following observations in reference to poultices: The common practice in making poultices of mixing linseed meal with hot water, and applying them directly to the skin, is quite wrong, because, if we do not wish to bury the patient, we must wait until the greater portion of heat has been lost. The proper method is to take a flannel bag, the size of the required poultice, to fill this with linseed poul-

* See Glyceritæ in this report.

tice as hot as it can possibly be made, and to put between this and the skin a second piece of flannel, so that there shall be at least two thicknesses of flannel between the skin and the poultice itself. Above the poultice should be placed more flannel, or a piece of cotton-wool, to prevent it from getting cold. By this means the poultice may be applied boiling hot without burning the patient, and the heat gradually diffusing through the flannel, affords a grateful sense of relief, which cannot be obtained by other means.—Drug. Circ., January, 1879, p. 38.

Trousseau's Poultice for Rheumatic Arthritis.—The following directions for preparing and applying this poultice are given by Dr. Dieulafoy in "Paris Médical:" Take, according to the size of the articulation, from one and a half to two kilograms of bread, the latter quantity being required for the knee-joint. Cut the bread in pieces, removing the hard portions of the crust, and steep it in water for about a quarter of an hour, then express the saturated bread in a cloth so as to leave it merely moist. The bread thus prepared is set for three hours on a water-bath, and now forms a sort of half-dried paste, which is softened by the gradual addition of spirit of camphor. The mass is now kneaded for about five minutes, or until it acquires the tolerably firm consistence of glazier's putty; and here is the delicate point of manipulation, the right degree of consistence, neither too hard nor too soft, being essential; the general tendency being to make it too soft, through insufficient pressure before the bread is set on the water-bath, or the too copious addition of spirit of camphor. The paste thus obtained is spread on a piece of linen cloth of the shape of an elongated rectangle, and of a size sufficient to cover the whole joint. It is desirable that near the edges the poultice be at least of a centimeter in thickness, so as to avoid the too rapid desiccation to which their edges are liable. Over the surface of the cataplasm the following mixture, made very liquid, is spread: Camphor, 110 grains; aqueous extract of opium, extract of belladonna, of each 77 grains; alcohol, sufficient. The poultice being ready, its application is very simple. It is placed directly on the skin, and covered with oiled silk to prevent evaporation. The whole is set in place by means of moderately strong pressure exerted with a flannel bandage several yards long. Lastly, a second bandage of linen cloth of the same length is tied over in the same manner.—Drug. Circ., April, 1879, p. 86.

CERATA ET UNGUENTA.

Cerate of Acetate of Lead—A Substitute for the Official Cerate of Subacetate of Lead.—According to Mr. J. B. Moore the basic character of the chief medicinal ingredient, subacetate of lead, gives to Goulard's cerate an inherent tendency to change, which cannot be wholly overcome by the most powerful antiseptics, even if their use was admissible in sufficient quantity. He has tried the acetate of lead in place of the subacetate in forming the cerate, and found it to fully meet his expectations, producing an excellent cerate, bland and soothing in its effects. The following is the formula adopted: Acetate of lead, $\frac{1}{2}$ ounce troy; white wax, 4 ounces troy; olive oil, 8 ounces troy; camphor, 30 grains; hot water, $1\frac{1}{2}$ fluid ounces. To the wax, previously melted in a porcelain dish, in a water-bath, add one-half of the oil, dissolve the camphor in the remainder of the oil, and the acetate of lead in the hot water; then mix the solutions together in a half-pint bottle, shake vigorously until a smooth, homogeneous mixture is formed; gradually add this to the mixture of melted wax and oil, stirring constantly; lastly, remove the mixture from the bath, and continue stirring until cool.—Drug. Circ., September, 1878, p. 149.

Ointments.—Mr. A. F. W. Neynaber is of opinion that inasmuch as some ointments are too soft in summer, and others too hard in winter, the formulas for cerates, ointments, etc., be so modified as to allow some latitude to the judgment of the dispenser. He suggests the following formulas as good bases for ointments:

Simple Ointment.—Best olive oil (Lucca), 3 ounces; white wax, sufficient to make a soft ointment. One ounce of wax to three of oil is the average quantity required; in winter less, in summer more to be used.

Best Simple Ointment.—Best sweet oil of almonds, 7 ounces; spermaceti, 2 ounces; white wax, $\frac{1}{2}$ to 1 ounce. The simple ointments made with olive oil or sweet oil of almonds are not as liable to become rancid as those made with lard.—Drug. Circ., February, 1879, p. 41.

Ung. Aquæ Rosæ.—Mr. George W. Kennedy considers various points of objections to the present composition of this ointment, such as its liability to become rancid, the separation of water, its incompatibility with many substances prescribed with it, etc., and

recommends in its place the following modification, which, containing no water, he proposes to name

Unguentum Rosæ.—Take of expressed oil of almonds, ℥ix; spermaceti, ℥iss; white wax, ℥j; oil of rose, grs. viij. Melt the three first components together, and add oil of rose when the mixture begins to cool, stirring constantly until cold.—A. J. Ph., December, 1878, p. 573.

Cold Cream.—Hans M. Wilder gives the following formula for cold cream, which will be found most easy and convenient, inasmuch as continuous stirring is not indispensable: Lard oil (best), 4 ounces; white wax, 1 ounce; melt and add borax, $\frac{1}{2}$ drachm, in water, 2 ounces; perfume, q. s.—Drug. Circ., July, 1878, p. 120.

Cold Cream with Glycerin.—A. F. W. Neynaber communicates the following formula: Best olive oil (Lucca), or best sweet oil of almonds, 7 ounces; spermaceti, 2 ounces; pure white wax, 1 ounce. Melt in a porcelain dish on a water-bath; strain, if necessary, into another porcelain evaporating dish; stir until it begins to harden a little on the sides of the vessel; then add a warm solution of powdered borax, $\frac{1}{4}$ ounce, in glycerin, 2 ounces; mix. Add oil of rose, 4 drops; oil of bitter almonds, 4 drops.

If water is desired in the cold cream take: Powdered borax, $\frac{1}{4}$ ounce; glycerin, $\frac{1}{4}$ ounce; and add, when dissolved, distilled rose water, $1\frac{1}{2}$ ounces. Mix this solution with the fatty substance and stir until cold. During winter $\frac{1}{4}$ ounce white wax instead of 1 ounce will be sufficient.—Drug. Circ., November, 1878, p. 181.

Camphor Ice with Glycerin.—A. F. W. Neynaber gives the following formula: Best quality of stearin (stearic acid), 8 pounds; best quality fresh lard, 10 pounds; pure white wax, 5 pounds; spermaceti, 5 pounds. Melt on a water-bath in an earthen or porcelain dish; strain into a similar vessel; add a solution of 2 ounces powdered borax in 1 pound glycerin, previously warmed, to the melted substance when at the point of cooling; stir well; add camphor, 2 pounds, powdered by means of alcohol, 3 fluid ounces; stir well and pour into moulds.—Drug. Circ., November, 1878, p. 183.

Transparent Glycerin Jelly.—Dissolve 1 ounce of transparent soap in 4 ounces of water and 4 ounces of glycerin with the aid of gentle heat. While still warm add 20 ounces of glycerin. When cold perfume to taste, and pour into glass jars. It is pale amber in color.

Opaque Glycerin Jelly is obtained by mixing in a mortar 4 ounces of white soft soap with 6 ounces of glycerin; then mix 4 drachms oil of thyme with 4 pounds almond oil, and add this gradually to the glycerin and soap, taking care to incorporate each portion thoroughly before adding the next.—New Rem., March, 1879, p. 90; from Canad. Phar. Jour.

Mercurial Ointment.—Mr. Phil. Hoglan has found the method of triturating the mercury with old mercurial ointment to work well. He recommends that the suet and lard necessary be melted together and strained, and observes that during the time required for the cooling of the mixture (in the month of April) the mercury was extinguished. The cooled fats are then mixed with the extinguished mercury.—A. J. Ph., June, 1879, p. 295.

Itch Ointment.—The following formula for an ointment, which is said to effect a cure for itch in twenty-four hours, is given in Drug. Circ. (February, 1879, p. 42):

Balsam of Peru, 1 ounce; benzoic acid, 110 grains; oil of cloves, 40 drops; alcohol, 2½ drachms; simple cerate, 7 ounces. Dissolve the essential oil and the benzoic acid in the alcohol and mix with the cerate, then add the balsam of Peru.

COLLODIUM.

Cantharidal Collodion.—Dr. Gubler recently stated at the Therapeutical Society that cantharidized collodion forms the most practically useful of vesicants, all that is necessary being to paint with a brush within the exact limits to which blistering is required to be confined. The collodion dries and the blister is formed. So complete is the adhesion that when applied to an indocile child he is unable to remove the collodion before the vesicating action occurs.—Ph. J. Trans., July 20th, 1878, p. 46.

Collodium Iodoformiatum—Moleschott, who recommends this preparation for glandular swellings, enlargement of the spleen, orchitis, etc., prepares it by dissolving one gram of finely-powdered iodoform in fifteen grams of flexile collodium.—Ph. Centralh., October 3d, 1878, p. 373.

CONFECTIONES.

Mellago Tamarindorum.—Under the name of "Extract of Tamarinds," Karl Erba, of Milano, has introduced a specialty which is favorably mentioned by Dr. H. Hager. The preparation answers

to the "pulpa tamarindorum" of the Pharm. Germ., but is favorably distinguished from the latter in being free from the cellular tissue of the tamarinds; being a clear brown-red, thick, honey-like mass, which would be properly called "mollago tamarindorum," and deserves a place in the Pharmacopœia. Erba's preparation is recommended to produce a refrigerant drink by dissolving a portion in cold water, and is particularly recommended as such in fevers of a bilious and typhoid character. As a purgative it may be taken in doses of three to four spoonfuls, either by itself or dissolved in water.—Ph. Centralh., December 5th, 1878, p. 460.

DECOCTA ET INFUSA.

Infusions, etc.—Solubility of Vegetable Matter Promoted by Alkalies and their Salts—Dr. Blackwell suggests the application of certain alkalies or their salts in promoting the solution of vegetable matter in aqueous menstrua. The list of the agents that may be used for this purpose is quite large—the liquor potassæ, liquor sodæ chlorinatæ, many oxy-salts of potassa and soda, together with their iodides, chlorides, and bromides. Liquor potassæ is among the most efficient, but, in making a selection, reference should be had to the therapeutical quality desirable in the adjuvant. In some instances solution of chlorinated soda fulfils this object well; in others, borate of sodium, etc. The following prescriptions, which embody the principles set forth by the author, have been practically tested, and yield satisfactory results:

(1.) Myrrh, ʒss.; iodide of potassium, ʒj; water, Oss. Triturate the first two ingredients, moistened by a small amount of the menstruum, and add the balance gradually as the mass softens. S. A teaspoonful every three hours.

In the same manner prepare:

(2.) Myrrh, ʒj; borate of sodium, ʒj; water, Oss.

(3.) Myrrh, ʒss.; muriate of ammonium, ʒij; water, Oss.

(4.) Myrrh, ʒj; liq. sodæ chlorin., ʒss.; water, Oss.

(5.) Myrrh, ʒj; bromide of potassium, ʒij; water, Oss.

Ammoniac may with advantage be combined and treated in the same way.

Cold infusions of vegetable matter may be made with much facility by a short previous digestion in an alkaline solution. Labarraque's solution seizes immediately upon their texture, as is shown by its quick effect upon the color; the taste also attesting

to the absorption of the bitter principle. Its stimulant, antiseptic, and antacid qualities greatly enhance its medicinal powers, while the infusion is much less liable to fermentation than when prepared in the usual way.

(6.) Contused gentian, \mathfrak{z}_{ss} ; sol. chlorin. soda, $\mathfrak{f}\mathfrak{z}\mathfrak{vj}$; water, $\mathfrak{z}\mathfrak{vij}$. Mix the gentian with the chlorinated solution, allowing it to digest for an hour; then throw upon a percolator, adding water as required. S. Take a tablespoonful before meals.

Liquor ammoniæ is a powerful solvent, not only of resinous but of non-resinous vegetable matter. Of this the author has availed himself in dissolving aconite for external use, producing very quickly a most concentrated anodyne and powerfully stimulating embrocation.

(7.) Contused aconite root, $\mathfrak{z}\mathfrak{j}$; liquor ammon., $3\mathfrak{F}$., $\mathcal{O}\mathfrak{j}$. To the root add enough of the menstruum to cover and thoroughly moisten it. Digest for a few hours; place in a percolator, following with the balance of the alkaline liquid and sufficient water to make a pint. It may be used alone, or with some stimulating oil, that of sassafras being one of the best.—Drug. Circ., April, 1879, p. 74.

Infusion Apparatus with Constant Supply of Water.—E. Hoffmann has devised and recommends the apparatus illustrated by

FIG. 25.

Infusion Apparatus.

Fig. 25: *a* is the infusion pot; *b* a small kettle containing water covering the bottom about half an inch; *c* a ring-shaped reser-

voir for water, of about one liter capacity, communicating with the small kettle (water-bath) *b* by the tube *d*; the excess of steam passes out of *b* into *c* by the tube *e*, and is condensed during its passage, an equal quantity of water flowing back through *d*; *f* is a jacket of sheet iron. The kettle, *b*, may be heated by gas, spirit-lamp, or, preferably and more economically, by a petroleum lamp.—Arch. f. Ph., July, 1878, p. 50.

Infusion of Digitalis.—The infusion, though sometimes clear when just finished, very soon becomes turbid and unsightly. Delbert E. Prall, who finds this to be due to the tincture of cinnamon added, has sought for various agents that might contribute to the stability of the preparation, or to disguise the bitterness, without giving rise to a subsequent precipitate or turbidity. None of those tried seemed to answer perfectly, and inasmuch as the tincture of cinnamon in no way serves to mask the bitterness of the infusion, he advocates the revision of the present formula so that the tincture may be omitted and the filtered infusion directed. The latter will keep well during the time ordinarily required for its consumption by the patient.—A. J. Ph., September, 1878, p. 424.

ELIXIRES.

Elixir of Calisaya.—Mr. Thomas F. Main, after experimenting with various formulas, and trying in various ways to remove the objectionable tannic acid and retain all the alkaloids, has finally settled on the following formula, which, in his hands, has yielded good results: Take of Calisaya bark, in coarse powder (No. 20), 4 troy ounces; water, sufficient; muriatic acid, 140 grains; lime, 200 grains; deodorized alcohol, 1 pint; syrup, 1½ pints; spirit of orange (1:16), 1 fluid ounce; spirit of cinnamon, 40 minims; caramel, 1½ fluid drachms, or sufficient. Boil the Calisaya bark for fifteen or twenty minutes in 18 fluid ounces of water, mixed with one-third of the muriatic acid, strain through muslin and express; repeat this process twice with the same quantity of water and acid; mix the decoctions, heat them, and add the lime converted into milk of lime with 2½ fluid ounces of water, stirring constantly until the mixed alkaloids are completely precipitated; collect the precipitates on a muslin strainer, wash with distilled water, dry, powder, transfer to an 8-ounce flask, and pour on 6 fluid ounces of deodorized alcohol. Having well stoppered the flask heat in a

water-bath to boiling, shaking occasionally ; allow the solution to cool, pour off the supernatant liquid, and repeat the process twice, first with 6, finally with 4 fluid ounces of the alcohol. Mix the solutions, and when cold add sufficient deodorized alcohol through the filter to make the liquid measure 1 pint. Pour this solution into a five-pint bottle, add first the spirits of orange and cinnamon, and afterwards the syrup mixed with $1\frac{1}{2}$ pints of water ; mix thoroughly. Beat 120 grains of filter-paper into a pulp with 1 fluid ounce of water, add to the elixir, shake at intervals for a few hours, filter, and pass through the filter sufficient of a mixture of 3 parts of water and 1 part of deodorized alcohol to make 4 pints. Finally color with caramel.

Elixir of Calisaya and Iron is made from this by dissolving 256 grains of ammonio-citrate of iron in $\frac{1}{2}$ fluid ounce of water, and mixing this solution with $15\frac{1}{2}$ fluid ounces of simple elixir of Calisaya, obtained as above.

Ferrophosphorated Elixir of Calisaya is obtained by substituting pyrophosphates of iron for ammonio-citrate of iron in the above formula.

The author's experiments were made and reported in reply to a query of the Connecticut Pharm. Association.—Drug. Circular, June, 1879, p. 105.

Elixirs containing Protoxide of Iron.—The following formulas are given in "New Remedies" (September, 1878, p. 285):

Elixir of Protoxide of Iron.—Syrup of protoxide of iron (see Syrups), simple elixir, each 8 fluid ounces.

Elixir of Protoxide of Iron and Quinia.—Syrup of protoxide of iron, 8 fluid ounces ; sulphate of quinia, 192 grains ; dilute sulphuric acid, q. s. ; simple elixir, q. s. ad 16 fluid ounces. Mix the sulphate of quinia with 2 fluid ounces of simple elixir and add enough dilute sulphuric acid to dissolve it ; then make up the bulk to 8 fluid ounces and add the syrup.

Elixir of Calisaya and Protoxide of Iron.—Fluid extract of cinchona (Calisaya), $1\frac{1}{2}$ fluid ounces ; simple elixir, $6\frac{1}{2}$ fluid ounces ; syrup of protoxide of iron, 8 fluid ounces.

Elixir of Calisaya, Protoxide of Iron, and Bismuth.—Fluid extract of cinchona (Calisaya), $1\frac{1}{2}$ fluid ounces ; simple elixir, $5\frac{1}{2}$ fluid ounces ; citrate of bismuth and ammonium, 32 grains ; syrup of protoxide of iron, 8 fluid ounces ; hot water, 1 fluid ounce.

Dissolve the citrate of bismuth and ammonium in the water. If it should not dissolve entirely add very carefully a few drops of ammonia; then add the solution to the simple elixir, and finally add the fluid extract and syrup. Filter, if necessary.

Elixir of Phosphate of Iron.—The following formula is given in "New Remedies" (September, 1878, p. 284): Phosphate of iron,* 256 grains; hydrochloric acid, q. s.; water, 1 fluid ounce; simple elixir, q. s. ad 16 fluid ounces. Dissolve the phosphate of iron in the water with the aid of just sufficient hydrochloric acid; filter, if necessary, and add to the filtrate enough simple elixir to make 1 pint.

EMPLASTRA.

Elastic Adhesive Plaster.—Dr. W. P. Morgan finds that india-rubber sheets, when coated with adhesive plaster, such as recommended in Griffith's Formulary under the name of Boynton's (lead plaster, one pound; rosin, six drachms), furnishes an elastic plaster which, while being attached to the skin, would yield to the movements of that membrane and the parts beneath it without causing an unbearable sensation of stiffness or an uncomfortable wrinkling. The broad letter bands (sold by all stationers) will answer for this purpose in the absence of other sheet rubber.—N. Rem., April, 1879, p. 112; from Bost. Med. and Surg. Jour.

Cantharides Plaster.—The application is occasionally attended with unpleasant secondary action, particularly strangury of greater or less intensity. On this account, camphor or opium are dusted over the plaster in some cases, without, however, having the desired effect generally. Guyot Dannecy, who has had abundant experience in the hospitals of Bordeaux, has found that bicarbonate of sodium or effloresced carbonate when dusted over the plaster will always have the desired effect. He recommends that a mixture of equal parts of powdered flies and of the alkaline carbonate be dusted over the surface of the plaster, pressed well upon the plaster with the hand or otherwise, and then covered with waxed paper or oiled tissue-paper.—Ph. Centralh., February 27th, 1879, p. 90.

* It is suggested that if the phosphate of iron is made first it will while moist dissolve more readily and in a less quantity of hydrochloric acid. With proper precautions, also, a better "ferrous" compound can be obtained, than that usually found in commerce.—REP.

Chloral Plaster.—Dr. Solari prepares this plaster as follows: Cerate of Burgundy pitch is spread upon linen, and powdered chloral is then dusted over it in proportion of 1 to 2 grams to every 10 square centimeters of surface. It is recommended by Dr. Solari for pains of neuralgic or syphilitic origin. The plaster is allowed to remain on the affected part 24 to 48 hours, the small blisters are then punctured and dressed with cerate. The pain disappears with the healing of the small wounds thus formed.—Ph. Centralh., March 20th, 1879, p. 121.

ESCHAROTICA.

Elastic Crayon of Nitrate of Silver.—Dr. Pajot takes a lamina tent two millimeters in thickness, dips it in some thick mucilage, and rolls it in finely-powdered lunar caustic. When it dries he has a crayon of the usual thickness of a stick of nitrate of silver, which can be introduced into the cavity of the uterus without fear of breakage. In the same manner applications can be made to other cavities, and if necessary, with stronger remedies.—Drug. Circ., March, 1879, p. 58; from All. Med. Centr. Zeit.

Caustic Copper Crayons.—W. Weber finds that the method recommended by W. Steffen (see Proceedings, 1875, p. 54), which consists in heating the crystals until a portion of the water of crystallization is lost and a plastic mass obtained, etc., does not answer well when operating on a small scale, though when operating with larger quantities fair results may be obtained. He finds that uniformly satisfactory results may be obtained by driving off all the water of crystallization; this is known to be effected when the light powder produced after heating the sulphate for some time becomes heavy and compact. Small moulds of filtering-paper are then prepared; the heavy powder is introduced and shaken down so as to form a uniform column (pressure should be avoided, except on the upper part when the mould is about to be closed). The filled moulds are now carefully enveloped in a piece of linen previously moistened and wrung out, observing that the paper envelopes are not fractured. The dehydrated sulphate of copper absorbs the moisture with great avidity through the filtering-paper, and after 3 or 4 hours, or after remaining over night, the pencils will have become solid after the manner of plaster of Paris. If from excess of water the pencils

should have become soft, they may be dried by exposure to the air; after which they may be divided and pointed by the aid of a knife.—Arch. d. Ph., February, 1879, p. 160.

Pencils of Sulphate of Copper.—O. Primke prepares these as follows: Select large solid crystals of sulphate of copper and split them in half if they admit it, by means of a small band-saw. They are then rubbed down to about the shape desired with a sharp file. Finally they are rubbed smooth on emery paper laid flat on the table, immersed for a few moments in water, agitating them to and fro, whereby they attain lustre, and then dried with filtering-paper. A certain degree of dexterity is required in their preparation.—New Rem., March, 1879, p. 84; from Pharm. Zeit, No. 97, 1878.

Michel's Paste.—Dr. W. Yandell draws attention to this cautery, which is prepared by thoroughly rubbing together three parts of strong sulphuric acid and one part of finely-powdered asbestos. It is applied in the same way as the Vienna paste, the thickness of the layer depending upon the amount of tissue it is desired to destroy, varying, say, from one-eighth to four-eighths of an inch in depth. It is spread upon the diseased surface with a small wooden spatula or with the blade of a knife. The paste should always be freshly made.—New Rem., April, 1879, p. 118; from Louisville Med. News.

EXTRACTA.

Ethereal Extracts—Recovery of Ether from Residues.—E. Rohn draws attention to the uselessness in the directions of most of the Pharmacopœias to express the residue with the view to the recovery of ether in them. The amount so recovered does not pay for the trouble. In an abundant experience with this class of preparations, he has found it best to transfer the entire residue into a still, to add sufficient water to form a thin magma, and then, having secured the head to the still by tying with twine or otherwise, to heat the contents over the open fire to 60° C. (= 140° F.), when the ether will distil over, and all is recovered. The residue from 8–10 kilos of male fern, for instance, yielded in the course of a half hour over three kilos of ether. It is necessary to secure the head of the still, since the contents of the same are subject to violent bumping.—Schweiz. Wochenschr. f. Ph., December 6th, 1878, p. 425.

Extract and Resin of Jalap—Examination of Commercial Samples.—Charles D. Farwell has subjected several samples of commercial extracts and resins of jalap to comparative examination with a view to determining their relative purity and medicinal value. In each preparation, whether extract or resin, the moisture was determined by drying a portion over sulphuric acid; the portion soluble in water, by thorough exhaustion with that liquid, and drying and weighing the residual resins; the portion soluble in ether, by exhaustion of the residual resins with stronger ether; the residue from this last exhaustion was accepted as hard resin. The quantity of substance soluble both in water and alcohol, contained in the extract, was determined by exhausting the weighed portion of the dried aqueous extract by alcohol. The result is shown in the following table:

Extracts of Jalap contained	1	2	3	4
	Per cent.	Per cent.	Per cent.	Per cent.
Water.....	7.5	18.0	18.4	11.7
Resin.....	24.0	24.5	18.7	16.3
Soluble in water.....	68.5	62.5	67.9	72.0
Soluble both in water and in alcohol.....	26.0	27.0	24.0	19.0
Resins from extracts soluble in ether.....	8.5	10.8	16.3	14.7
Resins from extracts insoluble in ether..	91.5	89.2	83.7	85.3

Resins of Jalap contained	1	2	3	4
	Per cent.	Per cent.	Per cent.	Per cent.
Water.....	3.0	4.0	3.5	
Soluble in water.....	trace.	trace.	2.3	
Soluble in ether.....	6.5	9.0	9.7	5.8
Insoluble in ether.....	93.5	91.0	90.8	94.7

The extract and resin marked No. 4 in the table were prepared by the author by the processes of the U. S. Ph. The results are a very good showing for the commercial products.—A. J. Ph., August, 1878, p. 371.

Extractum Cannabis Indica—Relative Value as Determined by Solvents.—Mr. H. Deprez has subjected four samples of extract of Indian hemp to the successive action of the solvents indicated in the following table of results:

No.	Loss by heat.	SOLUBLE IN				Insoluble.	Total.
		Water.	Petroleum benzin.	Benzol.	Alcohol.		
1	1.7	1.5	73.8	18.4	1.4	8.3	100.1
2	1.2	1.7	73.8	17.5	2.3	8.5	100.0
3	10.5	3.4	65.4	16.5	1.4	2.7	99.9
4	2.0	18.8	60.2	15.4	0.9	2.7	100.0

No. 1 was prepared from gunjah by the process of the U. S. Phar.; No. 2, a sample prepared in Germany; Nos. 3 and 4, samples prepared by different manufacturers in England. 100 grains of each were taken. The loss by heat was determined by heating on a water-bath until the sample no longer lost weight. The portion designated insoluble was not only insoluble in the solvents above enumerated, but also in ether, chloroform, olive oil, oil of turpentine, and potassa.—A. J. Ph., November, 1879, p. 518.

Commercial Ergotin—Presence of Copper.—W. Steffen had occasion to subject a quantity of ergotin purchased by him to examination. Having dissolved 10 grams of the preparation with a view to further examination, an iron spatula was left in the solution for a short time, when, on removal, it was found heavily coated with copper, so heavy that it could be readily polished. This observation of course rendered further examination of the ergotin unnecessary, since the copper, evidently introduced by the concentration of the extract in a copper vessel, rendered it unfit for use.—Schweiz. Wochenschr. f. Ph., January, 1879, p. 19.

Extract of Malt—Examination of Commercial Samples.—W. R. Dunstan and A. F. Dimmock communicate the results of the examination of the commercial extracts of malt. These occur: 1, as a more or less viscid extract, containing 20 to 35 per cent. of water, and varying in color from golden yellow to deep brown; 2, as a thin solution, containing 60 to 80 per cent. of water; and 3, as a thin solution, containing, in addition to water, from 3 to 4 per cent. of alcohol, apparently the result of fermentation. Among the various brands the first form is most commonly met with. They contain albuminoids, phosphates, maltose, dextrin, and diastase; but the latter is often rendered inactive by the heat employed in evaporation, and particularly if the method of the Ph. Germ. is followed, which directs heating to 212° F. after the starch has been converted. The product

obtained by the process adopted by the Pharmaceutical Society of Paris (see Proceedings, 1878, p. 96), on the contrary, which directed the extraction of the malt with cold water, and subsequent evaporation at a temperature not exceeding 155° F., is found to be rich in diastase. The authors have devised a method whereby the relative proportion of diastase in malt extracts may be determined (see Diastase), and believe that the presence of this albuminoid in an unchanged condition is of much importance, since, according to the quantity present, a greater or less proportion of starchy food will be digested by it. The following table shows the results obtained :

Results of Examination of Trade Samples of Malt Extract.

Constituents.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Water (100° C.).....	61.3	67.6	32.0	27.0	19.6	20.0	19.4	31.9	24.2	19.0	84.5	30.2	86.3	20.0
Ash.....	1.0	1.2	9.2	1.2	1.4	1.6	1.4	1.1	1.6	1.1	0.4	1.1	0.3	1.5
Maltose.....	26.3	16.9	41.8	53.0	67.0	48.7	50.0	53.8	59.0	28.9	4.6	44.4	4.6	50.4
Dextrin.....	2.5	3.9	5.2	9.8	5.1	6.2	9.1	9.5	9.0	7.2	3.1	5.7	3.1	8.5
Albuminoids.....	6.3	6.2	6.1	6.3	7.7	5.9	8.2	6.3	6.2	6.3	4.6	4.0	0.5	5.0
Phosphates, as Phosphoric Pentoxide.....	0.3	0.3	0.3	0.4	0.5	0.2	0.5	0.2	0.3		0.1	0.3	0.06	0.5
Grams of extract required to convert one gram of Starch.....					17.3				29.0					34.0
Alcohol.....													4.1	

—Ph. J. Trans., March 8th, 1879, p. 734.

EXTRACTA FLUIDA.

Fluid Extracts.—Alonzo Robbins records some experiments made with senna and seneka, with the view of determining a proper method for preparing the fluid extracts from these drugs, as well as for the purpose of collecting general data of interest, in view of an early revision of the formulas for this class of preparations. A series of four experiments was made with each drug. In the first the drug was subjected to percolation without maceration; in the second, percolation was commenced after four days' maceration, in the usual way; in the third, what may be termed "interrupted" maceration was resorted to: the drug was macerated in the percolator four days, a certain quantity of percolate was obtained, maceration resumed for three days, another portion of percolate obtained, and maceration again resumed, etc.; finally, the fourth experiment was intended to corroborate the results obtained by the first experiment, from which it differed, as well

as from all the others, in that the percolate was obtained in 2 portions of 500 grams each, whereas in the first, second, and third experiments 20 portions of 25 grams each, followed by 1 portion of 500 grams, were obtained from 100 grams of the drug. The quantity of dry extract contained in each portion was determined by evaporating one gram of each to dryness in a watch-glass in a water-bath, and the result, together with the sp. gr. of the finished fluid extract, and of the menstruum employed, are given in a table. A table showing the rate of exhaustion is also given, and this, slightly modified to embrace a portion of the first table, is given below:

No.	Name.	1st.	2d.	3d.	4th.	Dry extract in 500 grams Dilute Per- colates.	Total.
		5 Percolates.	5 Percolates.	5 Percolates.	5 Percolates.		Dry extract obtained.
		Grams.	Grams.	Grams.	Grams.		Grams.
1	Senna.	30.25	3.55	.50	.28	.75	35.33
2	"	30.33	3.17	.98	.34	.50	85.32
3	"	30.50	3.14	1.04	.30	.50	35.48
4	"					.25	35.25
1	Seneka.	34.25	4.01	1.26	.49	1.00	41.01
2	"	33.25	6.50	1.52	.69	.25	42.21
3	"	33.25	6.13	1.60	.58	.50	42.06
4	"					.50	40.00

The senna was exhausted with a mixture of 1 part alcohol, sp. gr. 0.822, and 2 parts water; the seneka with a mixture of 15 parts alcohol, 0.822, 15 parts water, and 1 part water of ammonia, all by weight. The author finally offers formulas for the preparation of the fluid extracts named, and makes some remarks on repercolation, which he is inclined to favor under certain modifying conditions.—A. J. Ph., July, 1878, pp. 329–334.

Fluid Extract of Wild Cherry Bark.—Mr. Wilford O. Higgate regards a fluid extract of wild cherry bark, prepared by the process described below, as possessing all the virtues of the drug in the proper proportion:

18 troy ounces of the bark, in powder No. 40, are employed. 16 troy ounces are well moistened with a mixture composed of 4 parts glycerin, 4 parts simple syrup, and 2 parts water. The moistened powder is packed moderately tight into a glass percolator, and sufficient of the mixture poured on until the liquid be-

gins to drop; it is then stopped, set aside four days, and then percolated with the above mixture, to every 10 parts of which 1 part of alcohol has been added. The first 14 fluid ounces are reserved, 6 fluid ounces more are obtained, and these are percolated through the reserved 2 troy ounces of powdered bark, previously moistened for three or four days with the original menstruum. From this second portion of bark 2 fluid ounces of liquid are obtained, and this is added to the reserved 14 fluid ounces.

Fluid extract of wild cherry bark so made is permanent, has the proper odor and taste, and mixes well with water, forming a clear liquid.—A. J. Ph., March, 1879, p. 121.

Improved Liquid Extract of Ergot.—Mr. A. W. Postans recommends the following process, which yields a stable and active preparation, and is adapted from the process of the U. S. Pharm., for fluid extract of ergot, differing from this chiefly in the absence of acetic acid, the presence of which renders the preparation nauseous and unpalatable in his opinion:

To 20 ounces of freshly-powdered ergot, packed in a percolator, the extremity of which is closed, a mixture containing 10 ounces each of rectified spirit and glycerin, and 5 ounces of water, is added; the whole is then allowed to macerate for a week, at the expiration of which time the percolation is proceeded with, and the subsequent displacement continued with water until the drippings almost cease to have any taste or color. 18 ounces having been collected of the first liquid, the remainder is evaporated gently in a water-bath to 2 ounces, and mixed with the previous quantity, so that 20 ounces of this fluid extract exactly represents 20 ounces of freshly-powdered ergot.—Year-book of Ph., 1878, p. 543.

GLYCERITA.

Plasma.—Mr. W. Willmott has contributed an interesting paper upon plasma, in which he gives the result of his observations and studies in connection with what he considers the main objection to it, viz., its hygroscopic character. If plasma be kept in an air-tight stoppered bottle it will retain its firm consistence indefinitely. It owes its softening property, therefore, to the large extent to which the glycerin it contains is capable of subtracting moisture from the atmosphere, the starch playing no part whatever in the change thus brought about. This property of

glycerin is exactly in relation to the two following conditions, namely, the amount of superincumbent moisture and the extent of surface that may be exposed thereto. Experiments have satisfied the author that in a moist atmosphere glycerin will continue to absorb water until the proportion is three of water to one of glycerin, and when that point is reached there will be no further increase in the atmosphere named, but if the atmosphere be moderately dry the proportions are reversed, that is, the water will bear a relation of one part to three of glycerin when the neutral point is reached, and if it is in excess of that point water will evaporate until the relation is as stated. Upon this property of glycerin to absorb a greater or less quantity of water, according to the hygrometric condition of the atmosphere, Mr. Willmott bases the following modification of the process for preparing plasma: Five fluid ounces of glycerin are mixed with three fluid ounces of distilled water, the mixture is then transferred to a porcelain dish and the starch is then added, heat being gradually applied, with constant stirring, until a translucent jelly is formed. In this process the loss of weight will be from half to one ounce, according to manipulation, thus leaving the proportion of glycerin and water that is most desirable to resist the ordinary atmospheric conditions of moisture. The plasma will retain its form and plastic condition indefinitely, and the presence of water, so far from being objectionable, will be an advantage, since in application there will be less proneness to smarting and irritation. The glycerin of starch of the Phar. Germ. in part meets the objection in the ordinary formula by directing water (about 1 to 12) in its formula, but this is not nearly sufficient to rectify the hygroscopic character of the resulting preparation.—Ph. J. Trans., April 5th, 1879, p. 815.

Glycerite of Starch—Use as an Excipient for Pills.—Mr. L. C. Hogan states that he has used the glycerite of starch as an excipient for pills for the past five years and found it very satisfactory. It will form any substance, no matter how dry or contrary, into a firm tenacious mass, while the glycerin prevents the pill becoming hard.—N. Rem., March, 1879, p. 67.

Iodized Glycerin.—Dr. E. T. Blackwell recommends this preparation as an excellent form for administering iodine internally as well as for external use. It is prepared by mixing 3j of iodized oil of bitter almonds (which see under "Volatile Oils"), and 3vij

of glycerin, by weight, together. The preparation contains about two grains of iodine to the drachm, and may be given in doses of about two minims, corresponding to about $\frac{1}{18}$ th grain of iodine and $\frac{1}{3}$ th grain oil of bitter almonds.—Ph. J. Trans., November 2d, 1878, p. 349.

Glycerite of Hypophosphite of Zinc.—Dr. Charles G. Polk gives the following formula: 'Take of solution of hypophosphorous acid (50 per cent. terhydrated), 4 ounces; carbonate of zinc, water, of each sufficient; glycerin (C. P.), sufficient to make 16 fluid ounces. Rub the zinc to a paste with water, add to the hypophosphorous acid nearly to saturation, filter, and add the glycerin to the required amount. It has been administered in doses of ten drops thrice daily to a girl thirteen years old for chorea, and effected a cure when all other treatment had failed. The author is confident that it will be found superior to all other zinc preparations in nervous diseases.

LINIMENTA.

Linimentum Terebinthinæ Aceticum.—In a former paper (see Proceedings, 1876, p. 79), Mr. W. Symons had offered several improved formulas for the preparation of this liniment, which is official in the British Pharmacopœia, the improvements consisting mainly in the substitution of glacial acetic acid for acetic acid, B. P. (containing twenty-eight per cent.), thereby insuring a clear liniment, which is not possible if the official formula is followed. The author now again draws attention to this subject, and offers formulas in which spirit may be contained, such also forming clear mixtures. But a necessary condition with one and all of the formulas is that the glacial acetic acid should solidify at comparatively high temperature, consequently should be of the greatest possible strength. Five formulas, including those previously communicated, are now given, and are abbreviated in the following table:

	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
	Parts.	Parts.	Parts.	Parts.	Parts.
Glacial Acetic Acid, . . .	1	1	1	1	1
Liniment of Camphor, . . .	—	2	8	4	3
Turpentine,	2	2	8	4	2
Spirit of Camphor,	2	—	—	—	—
Castor Oil,	1	2	—	—	2

Of these formulas No. 4 corresponds in its acetic acid strength to the official formula, and in other respects well represents it,

on which account it is probably to be preferred; the others may possess advantages, which must be determined by medical practitioners rather than by pharmacists.—Ph. J. Trans., December 21st, 1878, p. 505.

The following modification of the formula for this liniment, which differs only from the official in the substitution of olive oil for the water introduced by the use of acetic acid, B. P., is suggested by Philip Princep: Oil of turpentine, 3 parts; glacial acetic acid, 1 part; olive oil, 2 parts; liniment of camphor, 3 parts; all by measure. It mixes perfectly. The use of spirit in this liniment, as suggested, would be objectionable, as acetic ether might be formed in the liniment if kept long.—Ph. J. Trans., February 1st, 1879, p. 652.

Mr. H. Collier observes that in the original formula for St. John Long's celebrated liniment, of which the liniment. terebinth. acet. of the B. P. is an imitation, the yolk of egg was used to form an emulsion. Yolk of egg, however, as well as gum or mucilage, are objectionable as components of a liniment on account of their sticky qualities. He finds in a tincture of *quillaia saponaria*, prepared from 4 ounces of the bark and 1 pint of rectified spirit, an excellent emulsifying agent for the oily components of the B. P. liniment, which is free from the objections above named. The following formula gives a creamy emulsion, which is permanent for at least six minutes after shaking: Take ol. terebinth., acid acetic., linim. camph., tinct. quillaia, of each equal parts. Shake the tincture, camphor liniment, and oil of turpentine, and then add the acetic acid, and again shake.—Ph. J. Trans., June 21st, 1879, p. 1033.

LIQUORES.

Concentrated Liquor Ammoniae Acetatis.—Mr. Louis Emanuel remarks that a number of pharmacists, of late, make a concentrated solution of acetate of ammonium, and dilute this to the required strength when dispensing. He recommends this expedient, but finds that much of the commercial acetic acid is unfit for the purpose, containing both copper and sulphurous acid; the former escapes detection by the eye when the officinal solution is prepared, while a decided blue tint is developed in the concentrated solution. He recommends that 10 fluid ounces of good acetic acid be saturated with ammonium carbonate, and the solution then evaporated to measure exactly 10 fluid ounces; it is then

tested with litmus-paper, and accurately neutralized if necessary. It should be dispensed by diluting 1 part with 7 parts, by measure, of carbonic acid water; the officinal solution containing carbonic acid, which is not of secondary importance, since its presence often allays vomiting. The ammonium carbonate should also be carefully examined, as the commercial article frequently contains animal oil and tarry matter.—A. J. Ph., March, 1879, p. 120.

Liq. Ammonii Acetatis.—Professor P. W. Bedford, in view of the recent advocacy of the preparation of this solution in concentrated form to facilitate dispensing, expresses himself unfavorable to the plan. One of the very objects which is desirable in this preparation is the small quantity of carbonic acid held in solution when the preparation is freshly made, and this, of course, is absent in the preparation made from a concentrated solution of acetate of ammonium. Presuming that the acetic acid is of officinal purity and quality, a fluid ounce of diluted acetic acid requires just 16 grains of carbonate of ammonium, which should be selected from a hard, translucent lump of the salt. As regards the quality of the two ingredients, they should be free from foreign odor, and should not rapidly destroy the color of a solution of permanganate of potassium.—Drug. Circ., May, 1879, p. 89.

Liq. Ammon. Citralis, B. P.—Mr. Henry Barton observes that this preparation, when made of the official strength, is liable to change. When prepared four times the strength of the B. P. it keeps perfectly, and the addition of three parts of water to one of the concentrated solution always furnishes a satisfactory preparation.—Yearbook of Pharm., 1878, p. 601.

Liquor Potassæ—The United States Pharmacopœia states that "liquor potassæ" has a sp. gr. 1.065. Mr. Ed. Rosenthal finds that when the officinal formula, directing its preparation from bicarbonate of potassium, is followed, the resulting product has a sp. gr. 1.047, and that when it is made according to the same standard, from potassa, the sp. gr. is 1.053. Mr. Rosenthal takes it for granted that the specific gravity is to be considered the standard for liquid preparations, and in accordance with this view he advocates a modification of the formula, increasing the quantities of bicarbonate of potassium and of lime 2 ounces and 160 grains each, the other conditions of the officinal formula remaining the same; or, if potassa is used, dissolving 640 grains, instead of 480 grains, in 1 pint of water. By either modification

a preparation having the sp. gr. 1.065, and a strength of 6.6 per cent. of hydrate of potassium is obtained.*—A. J. Ph., September, 1878, p. 432.

Fowler's Arsenical Solution.—The preparation of the Phar. Germ. is made with arsenious acid, potassium carbonate, and distilled water, and is somewhat stronger than the preparation official in the United States Pharmacopœia. It has been observed that the German preparation, under certain conditions, is liable to become mouldy, a condition which Dr. Hager thinks may be avoided by substituting soda for the potassa salt, and by not subjecting the preparation to filtration. J. Muller has recently communicated his observations on the same subject, and finds that the addition of a small percentage of borax, which need not exceed 0.5 per cent., will completely prevent the formation of mould. Such addition can in no way affect the therapeutic value of the preparation.—Ph. Centralh., March 6th, 1879, p. 97.

Liquor Ferri Dialysati.—F. Schneider communicates the following convenient method for preparing solution of dialyzed iron: 300 grams of commercial crystallized ferric chloride are dissolved in 100 grams of distilled water, and 350 grams of official solution of ammonia are gradually added, in small portions, observing that the liquid is kept well cooled, and that the precipitated ferric oxide is redissolved before the next addition. If, finally, a portion of the oxide remains undissolved, it is redissolved by the addition of a few drops of solution of ferric chloride. The clear solution is placed into a dialyzator, which floats in a basin of distilled water; the latter is changed daily until argentic nitrate no longer occasions any or but very faint turbidity. The dialyzed solution is then brought to the usual strength (5 per cent.; 1.046 sp. gr.). The yield is about 1900 grams; the time consumed 12 to 14 days.—Schweiz. Wochenschr. f. Ph., November 22d, 1878, p. 409.

Dialyzed Iron.—Mr. A. H. Jackson communicates some experi-

* Admitting that the author's observation as to error in the specific gravity of liquor potassæ is correct, he is in error when he accepts the view that the preparation should be on that account modified. The Pharmacopœia is explicit in its directions, and if they are carefully followed a product of the intended strength can be uniformly obtained. If the specific gravity of the carefully prepared product is found to differ from that stated by the Pharmacopœia, then it is in order that the specific gravity shall be corrected; and in this direction the author's observations are of value.—REP.

ments made with reference to its preparation, composition, and properties. The experiments show that neither solution of ferric chloride, B. P., nor a solution of neutral ferric chloride, obtained by subjecting hot iron tacks to the action of dry chlorine and dissolving the resulting ferric chloride, are suitable by themselves to produce dialyzed iron. The first, subjected to dialysis, was completely washed away; in the second case a muddy liquid resulted in the dialyzer and in the washing vessel surrounding it. A true dialyzed iron, containing 3.86 per cent. of ferric oxide and 0.154 per cent. of ferric chloride, was obtained as follows: 1 pound of a solution of ferric chloride was poured into a dilute solution of ammonia until the whole, after well stirring, had an ammoniacal smell; the mixture was poured on to a calico filter, and washed with water until the washings gave no precipitate with a solution of nitrate of silver; the precipitate was then transferred to a beaker containing 4 ounces of a solution of ferric chloride and heated on a water-bath, with stirring and addition of a little hydrochloric acid. Allowed to stand all night it was in solution next morning. The solution was subjected to dialysis, which was continued from the 15th of February (March?—KEP.) until the 29th of April, the wash water being renewed from time to time. At the last-named date the wash water ceased to affect litmus-paper. Some experiments in the direction of the usefulness of dialyzed iron as an antidote to arsenic were made, but are as yet incomplete.—Ph. J. Trans., October 12th, 1878, p. 281.

Dialyzed Iron — Examination of Commercial Samples.—R. Reynolds and C. H. Bothamley give a concise historical review of dialyzed iron and the results of their examination of commercial specimens, as follows:

Source.	Reaction.	Sp. gr.	Fe ₂ O ₃ per cent.	Cl. per cent.
1. London, M.....	Neutral.	1.0439	4.707	0.206
2. German.....	Acid.	1.0572	5.866	0.219
3. Fer. Bravais.....	Neutral.	1.0316	3.430	0.194
4. London, H.....	Neutral.	1.0560	4.484	0.051

The determinations were made as follows: The solution was weighed into a beaker, heated, the iron precipitated with a slight excess of ammonia, the liquid again heated to near boiling, and filtered. The precipitate was well washed with hot water, dried, and ignited. The filtrate was acidified with pure nitric acid, and

the chlorine determined as silver chloride. The specific gravity was carefully taken at 18° C. (= 64.4° F.) and compared with water at the same temperature. The acidity in No. 2, which was the only sample that had a marked chalybeate flavor, was determined readily by wetting a piece of blue litmus with the liquid and washed by the finger under a stream of water, then dried, when a red color was produced, the others retaining a more or less purple tint.—Yearbook of Pharmacy, 1878, p. 589.

Dialyzed Iron.—Mr. G. H. Charles Klie has made a series of interesting observations in connection with the preparation of dialyzed iron. The ordinary forms of dialyzation he finds to operate very slowly, while the character of the parchment-paper, particularly its thickness, also exercises decided influence on the rapidity of dialysis. He recommends the dialyzator illustrated by Fig. 26 as admirably suited for the process. It consists of a glass percolator, into which a porcelain filtering-basket is adjusted, as seen in the figure. The latter should fit exactly, so that the top edges of both vessels are at a level. A piece of parchment-paper, previously soaked in warm water, is then folded at an angle of 60° and placed in the basket, to which it will fit pretty well without forming creases. The water is replenished as required by withdrawing the cork from beneath, allowing the water to drain off, and, after again inserting the cork, refilling the vessel by the aid of a funnel inserted between the folds of parchment-paper and the filtering-basket. By the use of a dialyzator constructed on this plan, a larger quantity of iron solution can be operated upon than with a dialyzator of ordinary construction; moreover, the process is ended much sooner, probably by reason of the high column of water, which affords ample room for circulation, and the process is also under better control, since it can be readily observed through the transparent media.

The parchment-paper should be as light as possible, other conditions being the same. Thus it was found that when parchment-paper measuring 248 square inches to 1 ounce avoirdupois was used, 11 days were required for completing the process; while with a paper measuring 560 square inches to the ounce the dialysis was completed in 5 days. Operating with the heavier quality of paper, and using a dialyzer constructed from a percolator according to the usual method, 40 days were required for

completely dialyzing a quantity of ferric solution corresponding in quantity to that used in the above-mentioned experiments.

FIG. 26.

Apparatus for Dialyzing.

A series of experiments were also made with a view to determine the form of ferric solution most suitable for dialysis. Ferric oxide obtained from ferric sulphate dissolved in just sufficient solution of ferric chloride was employed, and gave good results; also ferric chloride solution to which ammonia-water had been added considerably short of the quantity necessary to occasion a permanent precipitate. It was found, however, that when a solution of ferric chloride was employed, to which ammonia-

water had been added in such quantity that a further addition would occasion a permanent precipitate, the resulting product was most satisfactory, being of a darker color, perfectly transparent, and permanent.

Finally, the author finds it unnecessary to use distilled water for dialysis, common well-water, though unsuitable for the dilution of dialyzed iron, answering perfectly well. He has successfully used for this process hard limestone-water, which gave a copious precipitate with oxalate of ammonium, while the finished dialyzed iron, when first precipitated by ammonia, gave no precipitate on the addition of oxalic acid.

Using a half-gallon percolator, and the other parts of the apparatus of proportionate size, 1 pint of dialyzed iron can be made and finished in 5 days if parchment-paper of the proper quality and thickness is employed.—A. J. Ph., January, 1879, p. 1.

Dialyzed Iron—Apparatus for Continual Dialysis.—E. Lebaigue recommends the following apparatus for preparing dialyzed iron. It consists of a large flask with a faucet at the bottom, full of distilled water; a series of glass funnels, to the short necks of each of which is attached by rubber tubing a curved syphon passing upward and over the brim of the next funnel, which is placed at a slightly lower level, the last syphon discharging into a receiving vessel. Each funnel is provided with a plaited filter made of parchment-paper, and projecting $\frac{1}{2}$ to $\frac{3}{4}$ inch above the edge of the funnel. The first filter is now charged with solution of ferric oxychloride to about three-fourths of its depth. Distilled water is then poured into the funnel and allowed to remain in contact with the filter for twelve hours. Then the second funnel is charged in the same manner, and the faucet of the flask carefully opened, when the water of the first funnel will be replaced by fresh water. After twelve hours another funnel is connected with the series, and this is continued with as many filters as may be desired. The rate at which the distilled water is allowed to pass is controlled by its dropping from the last syphon-tube. Whenever the contents of the first funnel cease to have an acid reaction and to be precipitated by nitrate of silver they are withdrawn; the second filter is made the first, and a new funnel with filter inserted at the end.

The proportions adopted for making dialyzed iron are the following: Solution of ammonia, sp. gr. .920, 400 parts; distilled water, 400 parts; solution of ferric chloride, sp. gr. 1.260, 1000

parts. Mix the distilled water and the ammonia, and add the mixture gradually to the solution of ferric chloride, under constant stirring, until a clear mixture is produced. Experience has shown that among crystalloids, chloride of sodium dialyzes best. It is thought that it would, perhaps, be an advantage to replace the ammonia by soda or sodium carbonate.—Ph. J. Trans. (3), 9, 655; in J. Ch. Soc., May, 1879, p. 347.

Dialyzators.—Huizinga recommends the construction of dialyzators cheaply as follows: Parchment-paper is folded so as to form a rectangular bag; the joints are pasted together with a paste composed of a 15 per cent. solution of gelatin, to which 3 to 5 per cent. of previously dissolved chromate of potassium are added, and the bags are then exposed to the light so as to render the gelatin insoluble. The open end of the bag is then stretched over a suitable frame of hard rubber, by the aid of which the dialyzator may then be suspended in a suitable vessel. As many as may be necessary may then be suspended in the same vessel. This dialyzator is not only cheap, but it also presents a large surface to the action of the water. The rapidity of the washing is in proportion to the rapidity with which the water is changed in the surrounding vessel, the water flowing in above and off below.—Ph. Centralb., August 1st, 1878, p. 291.

Solution of Oxysulphate of Iron.—I. A. M., who has had some experience with the preparation called "Solution of Oxysulphate of Iron," gives the following formula for its preparation: Pure sulphate of iron, one ounce troy; pure nitric acid, one ounce troy; water sufficient to make a four-ounce solution (fluid measure?). Dissolve the sulphate of iron in the nitric acid, and when the fumes show that the effervescence has ceased add the water to make exactly four ounces of solution.—Drug. Circ., August, 1878, p. 135.

Aromatic Liquid Pepsin (Biroth).—Saccharated pepsin, 16.5 p.; hydrochloric acid, 3.7 p.; glycerin, 177.1 p.; orange-flower water, 236.0 p.; bitter-almond water, 2.0 p. Dissolve the pepsin in the aromatic waters, to which the acid has been added, then add the glycerin. Dose: One-half to one teaspoonful for children; a tablespoonful for adults.—New Rem., April, 1879, p. 125; from L'Orosi.

Phosphorus Solutions.—The following formulas for medicinal

solutions of phosphorus are given in "Drug. Circ.," April, 1879, p. 73:

Phosphorated Ether.—Phosphorus, 2 to 3 parts, cut in small pieces; macerate for 5 to 6 days with 100 parts ether; pour off and strain through glasswool. Contains about 1 per cent.

Phosphorated Chloroform.—Phosphorus, in small pieces, 5 parts; absolute alcohol, 1 part; chloroform, 100 parts. Digest until nearly all the phosphorus is dissolved. Strain through glasswool.

Phosphorated Cod liver Oil.—Dry phosphorus, 1 part; dissolve in olive oil, 200 parts; add cod-liver oil, 9.800 parts. A tablespoonful contains $\frac{3}{16}$ grain of phosphorus.

Solution of Iodoform and Iodoformed Lint.—Mr. G. A. Keyworth observes that when tincture of iodine is shaken with a fragment of fused potash, so as to remove the color, the essential step in the preparation of iodoform, the characteristic odor of the substance appears. In this simple form the fluid possesses great energy as a therapeutic agent, more especially in the healing of indolent sores. The odor of iodoform may be readily concealed by the addition of eau de Cologne or lavender-water. The solution affords an elegant substitute for tincture of iodine. Lint soaked in this colorless perfumed liquid and allowed to dry is a singularly useful application for various sores, promoting the healing process with much energy. Equal parts of this fluid and glycerin form a very useful combination for many purposes.—Yearbook of Ph., 1878, p. 542.

Formulas for Subcutaneous Injections.—The following formulas are reprinted from a pamphlet published by Mr. Chas. I. Powers, and inasmuch as they are likely to be of use in cases when it is desirable to administer medicines by the hypodermic method, are reproduced here from "Drug. Circ.," October, 1878:

Acidum Benzoicum.—Benzoic acid, 1 part; alcohol, 12 parts. Dissolve.

Aconitia.—Aconitia, 3 grains; water, 300 minims. Mix and filter. Each minim represents $\frac{1}{100}$ grain aconitia, and from 3 to 6 minims can be injected as a dose.

Apomorphiæ Murias.—Muriate of apomorphia, 3 grains; distilled water, 300 minims. Mix and filter. 10 to 11 minims can be injected at one dose as an emetic in opium-poisoning.

Atropiæ Sulphas.—Sulphate of atropia, 3 grains; distilled water, 300 minims. Hypodermic dose, $1\frac{1}{2}$ to 3 minims.

Ammonia Fortior.—Stronger water of ammonia, 1 part; distilled water, 2 parts. Inject one-half syringeful, or more, to overcome the toxic effect produced by the bite of a venomous snake. (Halford.)

Camphora.—Camphor, 1 part; alcohol, 12 parts. Dissolve and filter. (Rohde.)

Quiniæ Sulphas or Murias.—Quinia salt, 15 grains; distilled water, 154 grains; arom. sulph. acid, q. s. Dissolve and filter. 1 minim = $\frac{1}{12}$ grain. Hypodermic dose, 5 to 15 minims.

Chloral Hydras.—Chloral hydrate, 75 grains; distilled water, 75 minims. Mix and filter.

Caffeia.—Caffeia, $7\frac{1}{2}$ grains; spirit of wine, 75 minims; water, 75 minims. Mix and filter. 1 minim contains $\frac{1}{20}$ grain caffeia. Hypodermic dose, 4 to 15 minims.

Conia.—Conia, 1 grain; dilute spirit of wine, water, of each, 60 minims. Mix and filter. 1 minim = $\frac{1}{20}$ grain. Hypodermic dose, 2 to 4 minims.

Curare or Woorara.—Woorara, 3 grains; distilled water, 300 minims. Hypodermic dose, 4 to 9 minims.

Extractum Opii.—Aqueous extract of opium, 5 grains; water, 10 minims. Mix. 1 to $1\frac{1}{2}$ minims a hypodermic dose. (Lebert.)

Ergotinum.—Extract of ergot, 38 grains; dilute spirits, water, of each, 114 minims. Each minim contains about $\frac{1}{8}$ grain extract. Hypodermic dose, 5 to 12 minims.

Hydrargyri Bichlor. Corros.—Corrosive sublimate, $3\frac{3}{4}$ grains; distilled water, 375 minims. Mix and filter. Hypodermic dose, 5 to 10 minims.

Hydrargyri Biniodidum.—Biniodide of mercury, $3\frac{3}{4}$ grains; iodide of potassium, 45 grains; distilled water, 375 minims. Make a solution. Hypodermic dose, 7 to 10 minims.

Potassii Iodidum.—Iodide of potassium, 75 grains; distilled water, 225 grains. Mix and filter. Hypodermic dose, 5 to 10 minims.

Morphiæ Sulphas, Acetas, or Murias.—Morphia (salt?), $1\frac{1}{2}$ grains; distilled water, 75 minims. Dissolve and filter. Hypodermic dose, $4\frac{1}{2}$ to $7\frac{1}{2}$ minims.

Didama's Hypodermic Solution of Morphia and Atropia.—Sulph. morphia, 24 grains; sulphate of atropia, 1 grain; oil of bitter almonds, 1 drop; water, 2 ounces. Dissolve and filter. 10 minims contains $\frac{1}{4}$ grain morphia and $\frac{1}{8}$ grain atropia. These amounts have been found by experience to balance each other, so that the

full anodyne effect of the morphia is secured without nausea. The oil of bitter almonds prevents all muddiness.

Nicotia.—Nicotia, $\frac{1}{2}$ grain; distilled water, 2 drachms. Hypodermic dose. 4 minims.

Spiritus Ætheris.—30 to 40 drops, divided among the four extremities, as an excitant.

Strychniæ Sulphas or Nitras.—Sulph. strychnia, 2 grains; distilled water, 1 ounce. Dissolve. Hypodermic dose, 5 minims.

Tinctura Cannabis Indicæ.—Tincture of cannabis Indica, distilled water, equal parts. Mix. Hypodermic dose, 4 to 11 minims. (Eutenberg.)

Tinctura Opii.—Tincture of opium, 3 to 11 minims.

Veratria.—Veratria, $\frac{1}{2}$ grain; water, diluted alcohol, of each 50 minims. Hypodermic dose, 4 to 10 minims.

Subcutaneous injections are also employed to produce local irritation in the perinæum, and thereby act as a revulsive. It has also been employed of late for the destruction of new formations. The following remedies are used in producing these results:

Acid. Acetic.—Acetic acid, 1 part; water, 5 parts. Inject 30 drops into a swelling.

Argenti Nitras.—Nitrate of silver, 30 grains; distilled water, $\frac{1}{4}$ ounce. Dissolve. Immediately after some of the solution has been injected into the swelling Thiersch recommends a solution of common salt to be injected.

Tinctura Iodini.—Tincture of iodine, 1 part; water, 50 parts. Lücke recommends 3 to 6 drops, or even more, of the undiluted tincture to be injected in case of struma and chronic swelling of the lymph glands.

Other Iodine Solutions are:

(1.) Iodine, 7 grains; iodide of potassium, 35 grains; water, 770 grains.

(2.) Iodine, 2 grains; iodide of potassium, 38 grains; water, 463 grains. (Rumbold.)

(3.) Iodine, 1 to 2 parts; glycerin, 100 parts. (B. Fränkel.)

Spiritus Vini.—Schwabbe recommends $\frac{1}{4}$ to $\frac{1}{2}$ syringeful against struma.

MISTURÆ.

Castor Oil Mixture.—Dr. Wm. V. Ezell sends to the "Louisville Medical News" the following formula, with the statement that it is so palatable that the patient does not recognize the nature of

the medicine unless told what it is: Castor oil, 1 oz.; tincture of cardamom comp., 4 drachms; oil of wintergreen, 4 drops; powdered gum arabic, 3 drachms; white sugar, 2 drachms; cinnamon-water to complete 4 ozs. Make an emulsion.—Drug. Circ., September, 1878, p. 150.

Pleasant Castor Oil Mixture.—According to Dr. Harcke (Berliner Klinische Wochenschrift) castor oil may be made into a pleasant mixture when it is mixed with sufficient coarsely granular sugar to form a thick paste. Generally about three parts of sugar are required to one part of the oil, which may be flavored by the addition of a little powdered cinnamon or grated lemon-peel. In place of the sugar, also, compound licorice-powder may be used, two parts of which are required to one part of oil. The mass is formed into a bolus, which may be readily swallowed with a little water.—Ph. Centralh., June 5th, 1879, p. 230.

Mistura Conii, Ferri, etc.—This mixture, which originated with Professor William Tully, and is in use in Connecticut, is made as follows: Extract of conium, 5 drachms; carbonate of iron, 10 drachms; compound tincture of cinnamon, 2 fluid ounces; oil of cassia, 18 drops; oil of wintergreen, 20 drops; tincture of Tolu (2 ounces in one pint), half a fluid ounce; sugar, 8 ounces; water, sufficient to make a pint.—A. J. Ph., June, 1879, p. 322.

Professor Gross's Saline Mixture.—The following formula is communicated by Am. Jour. Ph. (June, 1879, p. 322): R. Antimonii et potass. tart., gr. ijss.; magnesi sulph., ʒij; morphiæ sulph., gr. j½; aquæ dest., ʒx; syr. zingiber. vel simplicis, ʒij; acid. sulph. arom., ʒss.; tinct. veratr. virid., ʒjss. Mix. Sig.: Saline and antimonial mixture. Average dose, ʒss., to be diminished in the event of vomiting or much nausea.

A Clear Guaiacum Mixture.—Mr. Balmano Squire has found that tincture of guaiacum will mix with an equal volume of glycerin to form a clear solution, and finds that such a mixture considerably modifies the pungent and nauseating flavor of the tincture. The tincture to be used is one made with rectified spirits, and not the ammoniacal tincture of the B. P., one-half to one drachm to one or two drachms of glycerin being given at a dose. If it is desirable to dilute this mixture, it must be diluted with glycerin.—Ph. J. Trans., May 3d, 1879, p. 894.

Phosphorus Mixture.—Dr. C. G. Polk communicates the following formula for a phosphorus mixture: Phosphorus, 1 grain;

carbon trichloride, 2 drachms; mucilage of acacia, 8 ozs.; syrup of orange-peel, 8½ ozs. Mix. Dose, a teaspoonful thrice daily. If more convenient, an equivalent amount of carbon bisulphide, deodorized by copper turnings, can be used. The author has found phosphorus, thus administered, to be more active than when given in the pill form.—Drug. Circ., March, 1879, p. 58.

Picrate of Ammonium Mixture—Remedy for Whooping-cough.—The following mixture is recommended for whooping-cough, the dose for a child six months old or under being a teaspoonful every three hours, doubling the dose for a child one or two years old, and giving as much as one-eighth grain of picrate of ammonium to a child three to five years of age: Picrate of ammonium, 1 grain; chloride of ammonium, 24 grains; powdered extract of licorice, 1 drachm; water, 3 ozs. Mix.—Drug. Circ., August, 1878, p. 139.

Mixtures containing Iodine or Iodide of Potassium.—Hans M. Wilder draws attention to the following mixtures, both of which had been properly dispensed, but gave rise to complaint because of certain peculiarities to be mentioned:

1. Iodine, 2 grs.; iodide of potassium, 1½ drachms; anise-water, 5 fl. ozs.

This mixture, brownish at first, became colorless within half a day, and was rejected on that ground by the physician, who supposed that the iodine had been omitted. The change was doubtless due to the essential oil of anise in the water.

2. Iodide of potassium, 2 drachms; comp. tinct. cinchona, syrup, of each 1½ fluid ounces.

The physician tested this mixture for iodine, and failing to obtain the reaction by ordinary tests, concluded that the druggist had omitted the iodide. It is well known that the ordinary tests for iodine fail in the presence of tannic acid; but it is equally well understood by experts that its presence can be detected by suitable manipulation.—Drug. Circ., July, 1878, p. 120.

Soda Mixture.—Dr. Sumner, of Hartford, originated the following formula, in use in Connecticut: Syrup of rhubarb (made from the root by infusion), 4 fluid ounces; bicarbonate of sodium, 1 drachm; spirit of spearmint, ½ fluid drachm.—A. J. Ph., June, 1879, p. 322.

Gadberry's Spleen Mixture.—J. A. W. gives the following for-

mula for this mixture, prescribed in some parts of the South : Solution of oxysulphate of iron (see "Liquores"), $\frac{1}{2}$ fl. oz.; sulphate of quinia, 30 grains; nitrate of potassium, 150 grains; essence of cinnamon, 1 fl. drachm; water, sufficient to make an 8-oz. mixture. The dose of this preparation is one teaspoonful three times a day in chronic enlargement of the spleen.—Drug. Circ., August, 1878, p. 135.

Emulsions.—The large proportion of gum required to emulsify oils by the process of the Pharm. Germ. is an objectionable feature when a large amount of oil is to be so treated. Ph. H. Dilg recommends the method in general use among Philadelphia druggists, namely, to first form a mucilage, and then adding the oil gradually, whereby much less gum is required. He has succeeded well with \mathfrak{zj} of gum, $\mathfrak{f}\mathfrak{z}\mathfrak{iv}$ water, and $\mathfrak{f}\mathfrak{z}\mathfrak{j}$ oil, then sufficient water to make $\mathfrak{f}\mathfrak{z}\mathfrak{ij}$, after which it may be diluted to any desired extent. Emulsions so made will keep without separating for about a week, and when separated may readily be restored by agitation.—A. J. Ph., July, 1878, p. 326.

Cod-liver Oil Emulsions.—Mr. William Gilmour gives the following method for preparing cod-liver oil emulsions, which deserves attention :

Let three drachms of the finest white powder of tragacanth be rubbed up in a large mortar with three ounces of glycerin. To this add as much boiling water as will convert it into a thick transparent jelly, from eight to ten ounces probably being required. After cooling add the cod-liver oil, which should first be mixed either with plain water or lime-water in the proportion of one part of the latter to three of the oil, or if, as is customary, the emulsion is intended to contain the hypophosphites of lime or soda, let these be added to the plain water previous to mixing with the oil, and then let this primary emulsion be gradually added to the mucilage of tragacanth with constant stirring. In the process of mixing the emulsion not only creams, but also thickens up to a certain point, and individual taste must settle the extent to which the mixture may be carried. The author has found the three drachms of tragacanth to emulsify fifty to eighty ounces of what he calls the primary emulsion, the former being very thick and not easily poured from the mortar, the latter quantity flowing more freely and forming what he considers the better emulsion. In mixing the oil with the mucilage of tragacanth care must be taken not to add it too hurriedly, else it will

not emulsify. The mixture will simply break up into a clotted mass, and no amount of labor apparently will bring it back to the emulsified form. Under these circumstances the better way is at once to begin again with a small quantity of fresh mucilage, to which the clotted mass should be carefully added by degrees. In this way only can the emulsion be brought back to its proper form.

Regarding the flavoring ingredient, if oil of bitter almonds be used the author finds that a half per cent., or about two drops to the ounce of oil, is the proper proportion, and that of the two oils, namely, an oil deprived of its hydrocyanic acid or an oil containing it, the latter is much to be preferred.—Ph. J. Trans., March 22d, 1879, p. 773.

Ferrated Cod-liver Oil.—A. du Bell recommends lactate of iron for ferrating cod-liver oil, and states that it is far to be preferred to the benzoate recommended by Müller* (see Proceedings, 1874, p. 69) in 1873, claiming that benzoate of iron is apt to produce gastric disturbances, and to communicate to the oil an odor of urate of bilin. One gram crystallized ferric chloride and two hundred grams of light-yellow cod-liver oil are triturated together in a porcelain mortar, and two grams of concentrated lactic acid are added, when, in a few seconds, complete solution will be effected. The resulting solution is clear, has the color of ordinary cod-liver oil and its odor, and a mild pleasant taste.—Schweiz. Wochenschr. f. Ph., February 28th, 1879, p. 73.

Referring to this paper the editor of "Schweiz. Wochenschr. f. Pharm." observes that he has prepared ferrated cod-liver oil by Mr. Müller's method, and has never heard complaints of the nature named by Mr. Du Bell. He believes that the unpleasant odor observed by the latter is due to the use of benzoate of iron made from acid that is not obtained from benzoin. He also draws attention to the comparatively large quantity of lactic acid used in the preparation, and the presence of chlorine (HCl) introduced by the ferric chloride.

Iodized Cod-liver Oil.—Dr. E. T. Blackwell having determined that oil of bitter almonds is capable of uniting with one-third of its weight of iodine, forming a permanent solution (see "Volatile

* Godin recommended the solution of metallic benzoates in cod-liver oil, and particularly that of iron, in 1872. See Proceedings, 1878, p. 267.—REP.

Oils" in this report), he proposes the preparation of iodized cod-liver oil as follows: Iodized oil of bitter almonds (containing about 25 per cent. of iodine), 15 grains; cod-liver oil, Oj. Mix, and shake. A teaspoonful of this oil contains $\frac{1}{8}$ grain of iodine and $\frac{1}{10}$ th grain oil of bitter almonds. Manifestly these quantities can be increased or diminished as may be desirable.—Ph. J. Trans., November 2d, 1878, p. 850.

PILULÆ.

New Excipient for Pills.—Mr. R. V. Mattison draws attention to a pill excipient which has been in use for some time by Mr. W. J. Martin, of Cincinnati, and which he recommends very highly on account of its ready solubility, small bulk, unusual adhesiveness, and plasticity. Pills made with it, though they may become hard in time, disintegrate or dissolve easily. Its application as an excipient is almost universal. It is prepared by Mr. Martin by triturating 1 part powdered gum tragacanth and 7 parts powdered elm-bark with sufficient syrup or water, preferably the former, to make a plastic mass.—A. J. Ph., November, 1878, p. 515.

Pill Coating.—"W. G. S." writes to "New Remedies" (May, 1879, p. 139), that by the following simple method pills may be coated well and expeditiously: Wet the pills slightly with simple syrup, roll gently in powdered elm-bark until thoroughly covered, and allow them to dry. A firm coating is thus produced.

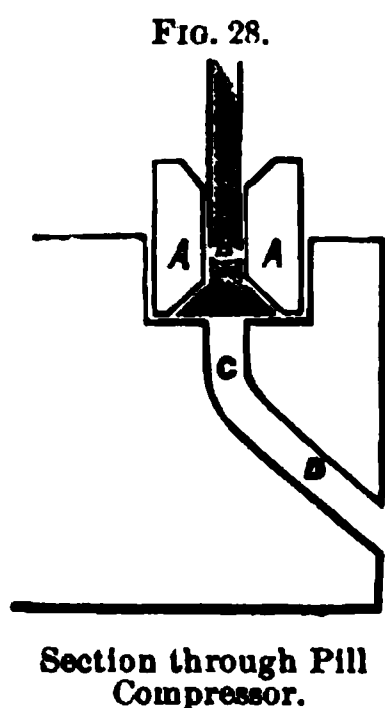
Compressed Pills—New Apparatus.—Mr. Bennett L. Smedley has designed the apparatus, illustrated by Figs. 27 and 28, which

FIG. 27.

Pill Compressor.

is capable of producing perfect compressed pills with the least expenditure of power, and which may be constructed at a small

cost. *A* is a block of hard wood, 16 inches long, 7 wide at one end, tapering uniformly to 5 at the other end, and 3 inches thick throughout. A hole is sunk at a point $2\frac{1}{2}$ inches from the smaller end of the block, in its central line, to receive the compressing cylinder. At the bottom of this hole an iron washer, $\frac{1}{2}$ inch deep,



is fitted. From the bottom of the hole a central tube is bored for an additional $\frac{1}{4}$ of an inch, at which point it is met by a similar tube bored through the side of the block, and sloping sufficiently to permit the escape of the pill. An upright, *B*, 4 inches high, is screwed firmly to the smaller end of the block, and to its upper end is attached by a hinge-joint the lever, *C*, $2\frac{1}{4}$ inches long. The iron in each one is 1 inch wide and $\frac{1}{2}$ an inch thick. The lever is slightly countersunk at the point where it touches the head of the compressing rod to admit of lateral motion. Fig. 28 presents a

transverse section through the cylinder. *A* is the hole admitting the cylinder, between the upper and lower segments of which a pill is shown at *B*. *C* is the outlet tube, emerging at *D*. The action of the apparatus is apparent.—*A. J. Ph.*, February, 1879, p. 75.

Phosphorus Pills.—The following formula has been employed for a period extending over a year, with good results, by Mr. A. W. Gerrard: *R.* Phosphorus, 1 grain; carbon bisulphide, 20 minims; compound tragacanth powder, 90 grains; chloroform, water, of each a sufficiency. Place the phosphorus in a Wedgwood mortar, pour over it the carbon bisulphide, then add the tragacanth powder and 10 minims of chloroform; mix into a uniform product, then add water a sufficiency to form a pill mass, maintaining during the whole of the process the presence of chloroform. Divide into 30 pills. The chloroform forms a heavy vapor, which surrounds the phosphorus and prevents oxidation.—*Yearbook of Pharmacy*, 1878, p. 596.

Mr. Henry Barton finds none of the formulas, including that of the British Pharmacopœia, to produce a mass in all respects so satisfactory as that suggested by Messrs. Allen and Hanbury (see "Proceedings," 1876, p. 93). For stock Mr. Barton has usually made the mass into 50-grain balls, representing 1 grain of phosphorus, and covered them with a pill coating. When

required with other ingredients a minimum of spirit is usually all that is requisite.—*Ibid.*, p. 602.

The following formula is given in "Drug. Circular" (April, 1879, p. 73):

Phosphorus, $1\frac{1}{2}$ grains; simple syrup, $\frac{1}{2}$ drachm. Rub in a warm mortar till the phosphorus is sufficiently divided, then add: powdered tragacanth, 40 grains; powdered licorice, 15 grains; glycerin, sufficient (about $1\frac{1}{2}$ drachm). Make 100 pills.

Castor Oil Pills.—Mr. Giffard has found *ricinolate of magnesium* to act as a gentle laxative, and proposes it, on account of its soft consistence, to be made into pills, using for this purpose preferably powdered rhubarb, with which it forms a moderate purgative, which does not produce colic or the least intestinal irritation.

Ricinolate of Magnesium, for this purpose, is prepared by double decomposition, by pouring a neutral solution of an *alkaline ricinolate* into a solution of sulphate of magnesium. The white curdy precipitate that forms is washed several times on a filter or cloth. This ricinolate melts at 50° C. ($=122^{\circ}$ F.), and is insoluble in water, but soluble in alcohol, ether, and chloroform. From the alcoholic and ethereal solutions, when allowed to evaporate slowly, it is deposited in silky crystalline needles. The

Ricinolates of Potassium and Sodium are obtained very readily, being produced by simple contact of the oil with strong lye. The potash soap is soft, and resembles glycerole of starch. The soda soap is opaque, white, and possesses the characteristic unctuousity in a marked degree. It could most advantageously be substituted for ordinary soap as an excipient in purgative pills.—*New Remedies*, March, 1879, p. 76; from the *Monthly Magazine of Pharmacy*.

Ox-gall Pills.—Dr. Jewett originated the following formula, in use in Connecticut: Purified ox-gall, 36 grains; blue mass, 6 grains; powdered rhubarb, sufficient. Make into $4\frac{1}{2}$ -grain pills.—*A. J. Ph.*, June, 1879, p. 322.

Knight's Pills, in use in Connecticut, are made, according to Mr. Wood, of New Haven, as follows: Powdered aloes, 6 parts; powdered scammony, 3 parts; powdered gamboge, 1 part. Make into $4\frac{1}{2}$ -grain pills.—*A. J. Ph.*, June, 1879, p. 322.

Compound Hyoscyamus Pills, originated by Dr. Charles Hooker, and in use in the same State, are made as follows: Powdered colocyath, 6 drachms; powdered socotrine aloes, 4 drachms; extract of

hyoscyamus, 2 drachms; extract of conium, 2 drachms. Make into 240 pills.—A. J. Ph., June, 1879, p. 322.

Soft Capsules.—Detenhoff gives the following formula for preparing a mass for elastic (soft?) capsules: 1 part of gelatin, 2 parts of water, and 4 parts of glycerin; the solution evaporated to 5 parts.—Ph. Centralh., September 19th, 1878, p. 357.

PULVERES.

Wafer Capsules—Dose Compressor (Fig. 29).—Mr. J. Digne has introduced an improvement in the method of filling wafer capsules by subjecting each dose to compression before placing it between the wafers. The apparatus for this purpose is constructed of nickelled bronze, of three different sizes, and consists mainly of two portions, which may readily be separated for the

FIG. 29.



Dose Compressor.

purpose of cleaning, namely: a cylindrical base, and a piston with upper appendages. *A* is the piston, which is slightly hollowed out at its lower surface to produce a button conformable to the shape of the capsule. This piston moves smoothly up and down in the cylinder, *L*. The latter stands loose on a base, which is also slightly concave, and when the piston is pressed down the powder is compressed into a double convex button. The handle of the piston is common to all three sizes, which are imbedded in a common base side by side, and it may be screwed on to any one of the compressors. When using it, the cylinder is held with the left hand over the concave base, the dose is poured in, the piston replaced, and with the right hand forcibly depressed.

The apparatus is then separated into its two parts, the button removed and transferred to the wafer.—New Rem., April, 1879, p. 111; from Schweiz. Wochenschr. f. Phar., 1879, No. 47.

Dover's Powder.—Professor Albert B. Prescott has devised the following scheme for the valuation of Dover's powder, which is

dependent on the separation of the alkaloids by different solvents and their titration by Mayer's solution :

The dry powder is moistened with ammonia and shaken with several portions of benzole.

RESIDUE , containing <i>morphia</i> , indeterminate and inorganic matter, etc. Agitate with several portions of amylic alcohol ; separate, evaporate the amylic-alcoholic solution to dryness, and weigh as <i>crude morphia</i> . Dissolve in acidulated water, filter and titrate with Mayer's solution.	SOLUTION , containing <i>emetia</i> , <i>narcotina</i> , and perhaps some indeterminate matter. Concentrate, agitate with acidulated water ; separate the water solution from the benzole by decantation or filtering through a wet filter (the benzole will remain in the filter), concentrate, make slightly alkaline (ammonia), and shake with several portions of petroleum naphtha.	
	ALKALINE SOLUTION.	PETROL. NAPH. SOLUTION.
	<i>Narcotina.</i> Make slightly acid and titrate with Mayer's solution.	<i>Emetia.</i> Agitate with acidulated water ; separate, and titrate its acidulated water solution with Mayer's solution.

The petroleum naphtha should have the sp. gr. 0.725. 1 cc of Mayer's solution will precipitate 0.0189 gram emetia, or 0.0213 gram narcotina, or 0.020 gram morphia.

In accordance with the above "scheme," Mr. C. W. Heister has subjected a number of samples of Dover's powder to valuation, and, using three grams of the powder in each case, obtained the following result :

No.	Crude morphia.	Morphia determined volumetrically.	Per cent. morphia (volumetric).	Narcotina.	Per cent. narcotina.	Emetia.	Per cent. emetia.
1	.0400	.0282	.94	.0107	.35	.0060	.20
2	.0535	.0302	1.00	.0129	.48	.0057	.19
3	.0800	.0242	.80	.0086	.28	.0095	.31
4	.0455	.0282	.94	.0143	.47	.0081	.27
5	.0585	.0262	.87	.0107	.35	.0076	.25
6	.0620	.0303	1.00	.0107	.35	.0085	.28
7	.0510	.0282	.94	.0096	.32	.0057	.19
Average per cent.....			.92		.38		.24
U. S. P. standard.....			1.00				

—A. J. Ph., December, 1878, p. 561.

Camphorated Dover's Powder.—Dr. Eli Ives, of New Haven, has originated this powder, which is prepared as follows : Cream of tartar, 8 p. ; powdered camphor, 2 p. ; powdered ipecac., 1 p. ;

powdered opium, 1 p. Mix thoroughly, and pass through a fine sieve.—A. J. Ph., June, 1879, p. 322.

Tully's Powder.—The following formulas for “Tully's Powder” are communicated by Dr. C. W. M. Brown with a view to showing how uncertain a prescription may be if ordered by its popular name:

1. *Formula of Dr. H. M. Field, Professor of Therapeutics, Dartmouth Medical College:*

R. Pulv. camphoræ, .12; pulv. glycyrrhizæ, .50; morphiæ sulphatis, .015—.007. M.

2. *Formula of Dr. C. P. Frost, Professor of Theory and Practice of Medicine, Dartmouth Medical College:*

R. Cretæ preparatæ (Eng.), pulv. camphoræ, pulv. glycyrrhizæ, āā .32; morphiæ sulphatis, .015. M.

3. *From New Remedies, April 1st, 1875, p. 192:*

R. Pulv. Opii., .06; pulv. glycyrrhizæ rad., pulv. camphoræ, pulv. cretæ preparatæ, āā .20. M.

4. *From Mann's Prescription Writing. P. Putnam's Sons:*

R. Morphiæ sulphatis, .06; camphoræ, pulv. glycyrrhizæ, cretæ preparatæ, āā .65. M.

5. *From The Pharmacist, 1873, p. 156:*

R. Morphiæ sulphatis, .01; camphoræ, .28; calcis carbonatis præcip., .21; pulv. glycyrrhizæ rad., .10. M.

In addition to the above, the editor of Am. Jour. Phar. draws attention to the following formula, which, according to Dr. Barlow, as communicated to “New Remedies,” is Tully's formula, published in his *Materia Medica*:

R. Powd. opium, 1 part; powd. camphor, powd. licorice-root, precipitated carbonate of calcium, āā 3 parts. M. Morphia may be substituted for the opium if preferred.—A. J. Ph., April, 1879, p. 183.

Mr. A. F. Wood states that he has prepared Tully's Dover powder for many years for Professor Wm. Tully, for his own use and for his prescriptions, according to the following formula:

R. Morphiæ sulph., gr. j; cretæ prep., rad. glycyrrh. pulv., camphoræ pulv., āā ℥j. M.

Mr. G. B. Plummer, writing to the editor of A. J. Ph., quotes

Dr. Tully's remarks upon the subject of this powder (Tully's "Materia Medica," vol. i, part 2, page 1260), from which it appears that the following formula would be the correct one:

R. Morphia sulphate, part 1; powd. camphor, powd. licorice-root, English precipitated chalk, of each parts 20.—A. J. Ph., May, 1879, pp. 229, 230.

Tully's Powder.—Dr. Wm. Manlius Smith, who was a private pupil of Dr. William Tully, states that the formula above given by Mr. Wood is the one he commonly employed.—Ibid., June, 1879, p. 300.

Potter's Powder, in use in Connecticut, is prepared, according to Mr. Wood, of New Haven, by mixing together prepared chalk, 6 parts; powdered camphor, 1 part; finely powdered carbonate of ammonium, 2 parts.—A. J. Ph., June, 1879, p. 322.

Mercury with Chalk.—Ellwood G. Hendricks draws attention to the condition of some mercury with chalk, in which a large proportion of the metal had evidently become converted into the poisonous red oxide. He advises, therefore, that greater attention be given to this preparation by pharmacists, and that it be carefully examined before dispensing, especially if old. Attention is drawn to the reputed power of saccharine matter to prevent the oxidation of the metal.—A. J. Ph., July, 1878, p. 325.

SPIRITUS.

Compound Spirit of Juniper.—Mr. J. B. Moore is of the opinion that this spirit is too strongly alcoholic, and on the other hand does not contain sufficient oil of juniper, the essential ingredient upon which its medicinal activity is supposed to depend. In fact, it possesses no advantages over gin, and he therefore proposes the following formula for its preparation, in which the oil of juniper is increased twelvefold, and the spirit reduced to the strength of diluted alcohol: Oil of juniper, 4½ fluid drachms; oil of caraway, oil of fennel, of each 10 minims; alcohol, boiling water, of each 1 pint; diluted alcohol, sufficient; carbonate of magnesium, 10 drachms. First rub the oil thoroughly for fifteen minutes with the carbonate of magnesium. Then mix the alcohol and boiling water, and very gradually add, with thorough trituration, six fluid ounces of the mixture until a smooth and uniform mix-

ture is obtained. Transfer this to a half-gallon bottle; shake briskly for several minutes; then add the remainder of the menstruum in portions of one-fourth at a time, shaking vigorously after each addition. When cool, filter through paper, passing sufficient diluted alcohol through the filter to make the filtrate measure two pints.—Drug. Circ., July, 1878, p. 117.

Extract of Lemon.—A writer in "Druggists' Advertiser" communicates the following formula, which he claims is the most fruity extract that can be made: 'Take one box of lemons, cut in small pieces and set aside with 20 lbs. of white sugar and 16 gallons of diluted alcohol; stir occasionally for two weeks; drain off and put in a press, and draw off as much as possible of the liquor; place again in a cask and add 4 gallons of diluted alcohol, and let stand for a week; express again, and mix with the former extract. To now prepare the extract of lemon, dissolve 75 ounces of oil of lemon in 20 gallons of alcohol; add 5 gallons of the extract obtained as above; let stand for two or three days with frequent agitation; add five gallons of water; mix well, and again let stand for two or three weeks. The mixture, at first milky, afterwards becomes clear. Finally filter.—New Rem., March, 1879, p. 90.

Spiritus Nucis Juglandis.—Dr. Edward Makey, of Brighton, England, gives the result of his experience in the treatment of obstinate vomiting with spirit of walnut, a remedy almost obsolete, but for which he claims considerable efficacy as an anti-emetic, useful in many cases of obstinate emesis. The preparation he uses is obtained as follows:

Fresh walnuts, 30 ozs.; spirit of wine (rectified), 12 ozs.; water, q. s. Distil 16 ozs.

He administers it in drachm doses, repeated every one to four hours.—A. J. Ph., June, 1879, p. 323; from Jour. Nerv. and Ment. Diseases, April, 1879.

SUPPOSITORIA.

Suppositories—New Mould.—Professor Emlen Painter has devised and recommends the suppository mould illustrated by Fig. 30. The mould is made on the principle of Remington's pill machine for making compressed pills (see Proceedings, 1875). It consists of a cylinder, A, $1\frac{1}{2}$ inch in diameter by 2 inches in length, with a central bore or space, $\frac{1}{2}$ of an inch in diameter, rounded off a little at either end of the cylinder. This cylinder rests upon

a cylindrical stand, *B*, 2 inches in diameter by 1 inch in height, in the centre of the upper surface of which has been made a cylindrical spur, *C*, $\frac{1}{4}$ of an inch in height, with the upper end made slightly concave, and of such diameter that it will nicely fit the bore of the cylinder first described; a rod, *D*, $2\frac{1}{4}$ inches long, is made of the same diameter as the spur, with a conically concave depression, $\frac{1}{4}$ of an inch deep, turned in one end and leaving it with a sharp edge. On the other end of the rod is made or fixed a knob that will stand the sharp blow of a mallet—the pressure of the hand being sufficient, however, unless the suppository is made unusually long. The machine is best made of brass, nickel-plated; a thin plating of silver will also answer. The latter may be applied by making a solution of 20 grains of nitrate of silver in a half ounce of water, adding a strong solution of cyanide of potassium, just sufficient to redissolve the precipitate first formed, then adding a little prepared chalk, and rubbing the brass with the mixture. The brass, when not plated, will discolor the first of a lot of suppositories made. Obviously the instrument may be modified to suit any required size or shape.

FIG. 20.

Suppository Mould.

In using the mould the cacao butter is first to be powdered, and this, the author states, is readily accomplished by the intervention of a few drops of alcohol. The medicinal ingredient is then incorporated, and, having added a few drops of a fixed oil, the whole is worked into a plastic mass, which is rolled to the required length and divided on a tile. It should be rolled in powdered elm-bark or lycopodium, to prevent it from adhering to the machine.

The mass having been introduced into the adjusted cylinder, it is pressed firmly with the rod, which is turned several times to enable the ready detachment of the suppository; the upper cylinder is then lifted, turning it in the act, and the suppository pushed out.—*A. J. Ph.*, August, 1878, p. 379.

Suppositories—New Method of Making.—Mr. E. T. Ellis draws attention to a method of making suppositories for which Mr. H.

C. Archibald has designed the apparatus illustrated by Figs, 31, 32, 33, 34. *A* is the hopper, in which is thrown the mixture of cacao

FIG. 31.

FIG. 32.

Suppository Mould.

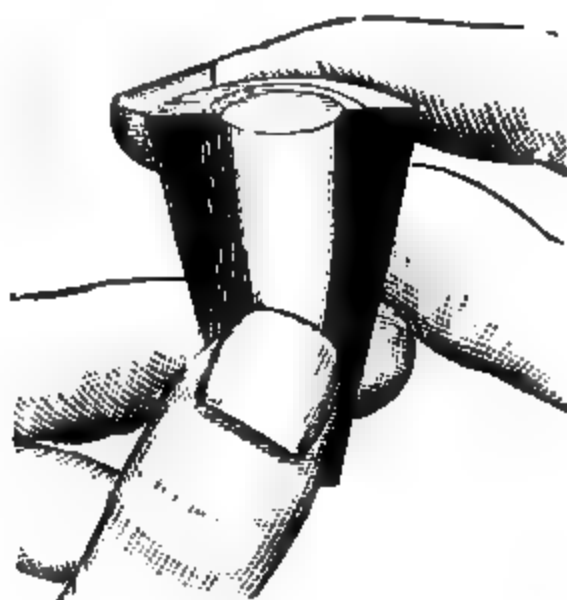
Swinging-bed open, with Mould.

butter with medicinal ingredients; *B* the plunger, used for compressing the suppositories; *C* the hand-lever; *D* the swing-bed, for holding the mould; *E* the mould split longitudinally; *G* the

FIG. 33.

FIG. 34.

Mould cut longitudinally.



Manner of discharging Suppository.

suppository in one-half of the mould after compression; *H* the manner of discharging the moulded suppository; *I* the cut-off. The apparatus is provided with moulds for different sizes, and

it will readily admit the finishing of eight to ten suppositories per minute after some experience, the manipulation being as follows:

The grated cacao butter is mixed with the medicinal ingredients by the aid of a spatula upon a piece of paper or a pill-tile; it is then introduced into the hopper, and by simply operating the lever to compress the mixture a perfect moulded suppository is made, which is cut off when the mould is swung around, so that no variation in the size of the suppository can result. It is necessary, however, that when extracts are prescribed that they should be used in the dry state, and the pharmacist using it will, therefore, find it convenient to keep the most important, such as opium, hyoscyamus, belladonna, aconite, rhubarb, etc., on hand in the form of powder.—A. J. Ph., April, 1879, p. 184.

Gelatin Suppositories—Wooden Moulds.—It has been stated that wooden moulds are unsuitable for moulding gelatin suppositories. C. B. (Schweiz. Wochenschr. f. Pharm., February 28th, 1879, p. 69) refers to this statement, and observes that he has used them with perfect satisfaction. It is only necessary to oil the surface well, so as to prevent the adhesion of the gelatin mass.

Vaginal Suppositories.—The use of gelatin for vaginal suppositories, etc., has already been mentioned in previous reports. The mass is made by dissolving 10 grams of gelatin in a mixture of 45 grams of glycerin and 10 grams of water by the aid of heat. Nearly all of the desirable medicinal ingredients may be incorporated with this mass, but for tannin it will, of course, not answer. A writer in "Pharm. Zeitschr. f. Russ." proposes to use agar-agar in place of gelatin for suppositories containing tannin. 1 part of agar-agar to 10 parts of water, or to 10 parts of glycerin and 20 parts of water, will make a suitable mass.—Ph. Centralt., October 10th, 1878, p. 387.

SUCCI.

Commercial Lemon-juice—Detection of Nitric Acid.—According to F. D. Scribani, nitric acid, which has recently come into use as an adulterant of lemon-juice, to increase its acidity, converts the citric acid of the juice, wholly or partially, during the process of concentration by heat, into oxalic, acetic, and carbonic acids, so that, on neutralizing the juice with milk of lime, there is obtained, instead of a citrate, a mixture of oxalate, acetate, and

carbonate of calcium. To detect the nitric acid, add to a small quantity of the juice in a test-tube an aqueous solution of ferrous chloride strongly acidulated with pure hydrochloric acid, and quite free from ferric salt; boil the liquid for a few minutes, and test it with sulphocyanate of potassium dissolved in water. If the liquid contains nitric acid it will be colored more or less deeply red, according to the quantity of ferric sulphocyanate thus produced. This process succeeds equally well if the juice likewise contains common salt, sulphuric or tartaric acid, or either of these substances alone. To apply it to the boiled lemon-juice the juice must be diluted with water, to facilitate the observation of the color produced by the sulphocyanate.—Gazz. chin. Ital., 8, p. 284, in J. Ch. Soc., November, 1878, p. 914.

Lime juice Cordial.—The following formula, given in “New Remedies” (March, 1879, p. 90), is said to make a highly satisfactory preparation: Glucose, 4 ounces; syrup, 16 fluid ounces; lime-juice, 16 fluid ounces; water, 28 fluid ounces; tincture of lemon-peel, triple orange-flower water, of each sufficient to flavor.

SYRUPS.

Medicated Syrups.—Isaac Davis finds the method of Orynski for preparing syrups without heat (Proceedings, 1871, p. 451) to answer well for simple syrup, but not so satisfactory for some medicated syrups. He proposes to prepare *syrup of squill* as follows: 2 fluid ounces of acetic acid are mixed with 30 fluid ounces of simple syrup; 2 troy ounces of squill, in moderately fine powder, are treated with sufficient of the syrup mixture to form a thin paste, which is allowed to stand for several hours, is then transferred to a glass percolator, the neck of which is stopped with a piece of wet sponge, and the pasty mixture is percolated by the acid syrup and finally with water to make 2 pints.

In a similar manner the author proposes to make syrup of wild cherry bark, syrup of senega, syrup of rhubarb, aromatic syrup of rhubarb, syrup of ipecac, compound syrup of sarsaparilla, compound syrup of squill, syrup of rhatany, etc. For all of these, with the exception of the wild cherry syrup, he proposes to add 1 fluid ounce of alcohol to each 15 fluid ounces of simple syrup, although the addition of alcohol may be dispensed with if desired.

Syrups prepared by this method have the advantage that in their preparation no principle is taken up in the early part of the proc-

ess to be discarded and filtered out towards the end.—A. J. Ph., July, 1878, p. 327.

Fruit Syrups.—Mr. Hermann Tiarks suggests the addition of syrup of cherries and raspberries to the list of officinal syrups, both of which are useful for producing refrigerant and agreeable drinks, and, on account of their greater stability, superior to the officinal lemon syrup. In connection with this the author makes some remarks based upon the process of the German Pharm. for fruit syrups, and the explanations and suggestions in Hager's "Commentary" on the same subject. The presence of pectin, as is well known, causes fruit syrups to gelatinize, and, unless it is very completely removed, it will soon cause them to mould and to spoil. To insure stable syrups, the fruits, after being crushed, are set aside for three or four days in an earthen jar, the mass being stirred once a day with a wooden spatula. The juice is now expressed and again set aside for a few days to complete fermentation and clarification. Any pectin not decomposed is detected by mixing the clear juice with a concentrated solution of sulphate of magnesium, when a precipitate or gelatinous mixture is produced. The juice should form a clear solution when mixed with two volumes of ninety per cent. alcohol. The fermentation is hastened, and the juice may subsequently be filtered more readily, if about two per cent. of sugar is added to the crushed fruit. After the filtration of the fermented juice, it is boiled with crushed sugar in the proportion of 5 parts of the former to 9 parts of the latter; the syrup is strained while hot, allowed to cool and stand for a day covered with a sheet of paper, and then filtered into dry bottles of convenient size, which are carefully corked and stored in a cool cellar. So prepared fruit syrups will keep well for several years.—A. J. Ph., January, 1879, p. 19.

Syrup of Licorice.—Stan. Martin proposes two formulas, one made with the commercial extract, the other with the root.

1. 50 grams of powdered licorice are left in contact with 150 grams of cold distilled water, and, when dissolved, filtered; the filtrate is mixed with 20 grams tartaric acid, 30 grams tincture of fresh lemon-peel, and 850 grams of simple syrup of 40° Baumé.

2. 500 grams of licorice-root, coarsely powdered, without the corky layer, are displaced with 1500 grams of cold distilled water. The percolate is made into a syrup by using for every 100 grams of the liquid 190 grams of sugar, and adding to the whole 30

grams of tincture of fresh lemon-peel and 20 grams of tartaric acid.—A. J. Ph., October, 1878, p. 478; from Bull. gén. de Thér., August, 1878.

Syrup of Ipecacuanha.—Stan. Martin proposes to prepare this syrup by dissolving 1.5 gram of an aqueous extract, prepared from an alcoholic extract of ipecac, and containing 15 per cent. of moisture, in sufficient warm simple syrup to make 1000 grams. The product is regarded to be more uniform in its medicinal properties than that prepared from the root.—A. J. Ph., October, 1878, p. 478; from L'Union Pharm., 1878.

Syrupus Violarum Odorat.—*Improved Method of Preparation.*—The components of *Viola odorata* that are desirable in this syrup are cyanin and violin, both of which are readily injured by heat, etc. C. Bernbeck prepares an alcoholic tincture which may be at once added to a very concentrated sugar syrup in the proportion of 1 to 9, or it may be preserved in small vials, the corks of which have been impregnated with an alcoholic solution of salicylic acid. The tincture is prepared as follows: 100 grams of the fresh flowers, deprived of the calyx, are beaten to a pulp in a brass, or, better, in a granite mortar, 50 grams of alcohol are gradually added, the pasty mass is allowed to stand six to eight hours in a covered glass or porcelain vessel, and is then strongly expressed. The liquid is then diluted to 100 grams with distilled water, filtered, and bottled as above stated. The syrup produced with this tincture has a violet-blue color and the odor of violets to perfection.—Zeitschr. Oest. Ap. Ver., June 1st, 1879, p. 247.

Lemon Syrup.—Citric acid, 2 ounces; white sugar, 5 pounds; essence of lemon, 1 drachm; alcohol, 2 drachms. Add the essence to the alcohol, and then allow the sugar to absorb it; add the whole to 1 quart* of water for a syrup. Two tablespoonfuls are enough to make a tumblerful of lemonade of the best quality.—Drug. Circ., June, 1879, p. 105.

Syrupus Juglandis Compositus.—Hager gives the following formula for this syrup, which in France is used with success in scrofulous and rachitic cases in children in place of *Varnier's syrupus antirachiticus*, the latter being reported to contain 5 per cent. of cod-liver oil. 20.0 extract. juglandis foliosum and 10.0 extract. corticis chinæ fusci are dissolved by digestion in 20.0

* Evidently the weights are intended to be avoirdupois, and the measure the imperial.—R&P.

spiritus vini, 30.0 vini Hispanici, and 60.0 syrupi sacchari; the solution is mixed with a solution of 5.0 kalii iodati, and 15.0 elæosacchari anisi, in 850.0 syrupi sacchari. The dose for small children is a teaspoonful, for larger children half a tablespoonful four to five times a day.—Ph. Centralh., May 8th, 1879, p. 186.

Aromatic Syrup of Yerba Santa.—Mr. C. A. Mosher has used yerba santa for some time for disguising the taste of nauseous medicines, principally quinia, with success, and finds an aromatic syrup, prepared by the subjoined formula, to be best adapted for this purpose:

Take of yerba santa, 1 pound; bicarbonate of sodium, 2 drachms; cinnamon, cloves, of each 1 ounce; aniseed, coriander-seed, cardamom, of each 4 drachms; cochineal, 2 drachms; sugar, 6 pounds; water, 1 gallon. Boil the aromatics, except the cloves, with the yerba santa, bicarbonate of potassium, and water for an hour, add the cloves and cochineal, and continue to boil twenty minutes; strain, express, and add the sugar, dissolving it with a gentle heat; lastly add water sufficient to make a gallon. A small quantity of brandy added when cold will improve the flavor of the syrup and keep it from souring.—Drug. Circ., March, 1879, p. 58.

Syrup of Croton Chloral Hydrate.—The following yields a nicely flavored syrup containing two grains of the medicinal agent in each fluid drachm:

Croton chloral hydrate, gr. xvj; tinct. aurant. recent., 3j; solve et adde syrupi, 3vij.—Drug. Circ., March, 1879, p. 58.

Syrup of Protoxide of Iron.—The following formula is given in "New Rem." (September, 1878, p. 284): Ferrous sulphate, 4½ ounces; sodium carbonate, crystallized, 5½ ounces; citric acid, syrup, distilled water, of each a sufficient quantity. Dissolve the sulphate of iron in 16 fluid ounces of water, to which 2 fluid ounces of syrup and 2 fluid drachms of sulphuric acid had been added. Filter the solution and heat it to boiling to expel the air. Cover it carefully to prevent further access of air, and let it cool. Dissolve the sodium carbonate in 16 fluid ounces of water, mixed with 1 fluid ounce of syrup, filter, heat to boiling, and let cool in the same manner. The lower the temperature of each solution the better. Then pour the iron solution, slowly and gently stirring, into the soda solution, throw the whole mass on a well-wetted muslin strainer, and wash the precipitate with recently distilled cold water, containing $\frac{1}{20}$ th of its bulk of syrup,

until the sulphate of sodium is nearly all washed out. It is not advisable to continue the washing too long, and a trifling amount of sulphate of sodium which may remain is of no consequence. Dissolve the precipitate with a sufficient amount of citric acid and enough cold water to obtain 16 fluid ounces. Then add the syrup (how much? Rep.). This must be preserved in small vials out of contact with air. This syrup would more properly be called "syrup of protocitrate of iron."

Manganese Syrups.—The following formulas for syrups containing manganese are extracted from a paper in "Drug. Circ." (October, 1878, p. 167), in which the various uses of manganese are concisely reviewed:

Syrup of Malate of Manganese.—Malate of manganese, 1 ounce; simple syrup, 16 ounces; essence of lemon, 2 drachms. An ounce of the syrup contains 30 grains of the manganese compound. The malate is obtained by treating carb. manganese with malic acid.

Syrup of Phosphate of Manganese.—Phosphate of manganese, $\frac{1}{2}$ drachm; syrup of Tolu, 27 drachms; syrup of cinchona, 5 ounces; essence of lemon, $1\frac{1}{2}$ drachms; powdered tragacanth, 10 grains. This preparation must be quickly made and kept well stoppered. The phosphate is obtained by decomposing a solution of phosphate of sodium with sulphate of manganese, collecting the precipitate, drying, and keeping in a well-stoppered bottle.

Syrup of Iodide of Manganese.—Carbonate of manganese, 1 drachm; hydriodic acid, sufficient to effect a solution, which is added to 17 ounces syrup of sarsaparilla and guaiacum.

Cough Syrup.—Dr. Kessler recommends the following extemporaneous formula for a cough syrup, with which he has obtained the most flattering results: Pix liquida, 20 drops; spiritus nitr. dulc., 1 drachm; syr. simpl., 2 ounces. M. Dose, a teaspoonful night and morning.—Drug. Circ., August, 1878, p. 139.

SAPONES.

Sapo Durus, B. P. (Olive Oil Soap), and Sapo Animalis.—Mr. Henry Barton has found these soaps, when dried to a suitable pulverizable condition, to give, as obtained from different warehouses, an average loss of twenty-five per cent.; taking into consideration that parcels are received into stock and kept for longer or shorter periods, under varying circumstances of storage, in

damp cellars, cold or hot warehouse rooms, etc., the liquid preparations of soap must vary considerably, both in the amount of solid matter and the water they contain. Mr. Barton therefore suggests that, in all cases, dried soap should be used, not in the form of powder, but in that of shavings produced by planing the bars and exposing the thin curls to a suitable temperature until a sufficient dryness has been obtained. The amount used in the various formulas could be readily adjusted.—*Yearbook of Pharm.*, 1878, p. 601.

Sapo Medicatus, P. G.—Improved Process.—H. C. Vielhaber finds that when the officinal directions of the *Phar. Germ.* are followed for the preparation of this soap, it is liable to acquire rancidity in time, and to lose its fine pulverulent condition. He considers that this is due to the fact that the soap cannot be washed sufficiently to deprive it of adhering chloride of sodium and glycerin. To overcome this difficulty the author proceeds as follows: The soap, boiled according to the directions of the *Pharm.*, salted, broken up finely, and washed several times on a straining cloth, is subjected to powerful expression, whereby all liquid is removed as completely as possible. If it is now dried and powdered the product is perfectly white, will keep well, and give but a faint reaction for chlorine.—*Arch. d. Ph.*, May, 1879, p. 411.

TINCTURA.

Soluble Essence of Ginger.—Mr. J. C. Thresh has succeeded in preparing a soluble essence of ginger, *i. e.*, one that will mix with water or syrup to form a clear solution, and yet retain all the flavor and a fair share of the pungency of that prepared by the ordinary method, as follows: Take of the finest Jamaica ginger in powder one pound, pour upon this eight ounces of rectified spirit, and after allowing to stand for several hours add more spirit; percolate to sixteen ounces. To this add two ounces of heavy carbonate of magnesia, agitate, and add twenty-four ounces of water. Shake well and filter, and if not entirely clear shake with a small quantity more of magnesia, and again filter. After a few days it becomes turbid, and deposits slightly, but if again filtered it appears to continue clear. The action of the magnesia is, in the opinion of the author, partly mechanical, partly chemical.

Mr. B. S. Proctor, on the other hand, finds that when essence of ginger, which has become milky from the addition of water, is mixed with a little alum or sulphuric acid it becomes clear after

standing some time (a week or two?). The quantity of alum or acid requisite is not sufficient to impart any taste to the essence produced, and may be got rid of (the acid most completely) by mixing with pure carbonate of lime and filtering. A clear, pungent, aromatic essence is thus produced, which turns slightly opalescent when mixed with water.—Yearbook of Pharm., 1878, pp. 509 and 511.

Tinct. Cort. Limonis and Tinct. Aurant. Recentis, B. P.—Mr. Henry Barton observes that while the fresh thin-sliced peel of lemon or orange presents considerable surface to the spirit, the best method of proceeding is to grate the rind from the surface of the fruit; the grated, light, almost wool-like peel is in a splendid condition for the action of the menstruum, and repays any extra patience required in its preparation.—Yearbook of Pharm., 1878, p. 601.

Tinctura Quiniæ, Br.—Mr. W. Martindale, at a recent meeting of the Phar. Soc. of Great Britain, called attention to the fact that the quantity of quinia sulphate directed in this preparation is more than can be retained in solution.* By the aid of gentle heat, as directed, the entire quantity of the salt can readily be dissolved, but after standing three days a white hard deposit formed which proved to be sulphate of quinia, and not tannate, as has by some been supposed. The difficulty can be overcome by using one part of rectified spirit to seven parts of tincture of orange peel, instead of all tincture for its preparation. Another method, and probably a better one, has also been found to answer well. This consists in the substitution of hydrochlorate of quinia for the sulphate. The hydrochlorate dissolves at once, without the aid of heat, and the preparation, after standing for several months, part of the time exposed to 32° F., and frequently below 40° F., has formed but an insignificant precipitate, and that not white.—Ph. J. Trans., November 16th, 1878, p. 407.

Compound Tincture of Iodoform.—Dr. Roe, in the "Medical Brief," furnishes the following formula, which produces a clear golden tincture, and will keep well for years: Iodoform, 15 grains;

* The formula of the Br. Pharm. is as follows: Take of sulphate of quinia, *one hundred and sixty grains*; tincture of orange-peel, *one pint* (imperial measure). Dissolve the sulphate of quinia in the tincture with the aid of a gentle heat, then allow the solution to remain for three days in a closed vessel, shaking it occasionally, and then filter.—U. S. D., 14th ed., p. 1516.

iodide of potassium, 2 drachms; glycerin, 2 drachms; stronger alcohol, 6 drachms. Rub the iodoform and iodide of potassium to a fine powder, add the glycerin, rub to the consistence of cream, then add the alcohol, and stir briskly until complete solution is effected. Dose, 15 drops, three times a day, on sugar or in syrup.—Drug. Circ., June, 1879, p. 107.

TROCHISCI.

Cinchonia Troches.—After trying various forms for the administration of cinchonia, Mr. J. O. Hughes found troches to be most acceptable, there being no adhering to mouth or teeth, while the alkaloid is quite acceptable to the stomach. Two formulas were used, one for children and the other for adults.

For Children.—Cinchonia "alkaloid," subnitrate of bismuth, of each, gr. 1; bicarbonate of sodium, gr. $\frac{1}{2}$; mucilage of tragacanth, powdered sugar, of each a sufficient quantity. Make one troche.

For Adults.—Cinchonia "alkaloid," reduced iron, of each gr. 2; bicarbonate of sodium, gr. $\frac{1}{2}$; arsenious acid, gr. $\frac{1}{8}$; mucilage of tragacanth, powdered sugar, of each a sufficient quantity. Make one troche. The mass is made with a good deal of sugar, and formed into pills, which are flattened with a spatula. A very slightly bitterish taste is developed. Aromatic powder and ammoniacal glycyrrhizin are very good disguisers.—New Rem., February, 1879, p. 46.

MISCELLANEOUS FORMULAS.

Condensed Milk, Infant Foods (Kindermehle) — Analyses.—Dr. N. Gerber has subjected a number of brands of condensed milk and of infant foods to analyses, the results of which are given in the subjoined tables. The subject is highly instructive, and on the assurance of the editor of "Schweizer Wochenschrift für Pharmacie" has been handled impartially. The present tables have been somewhat condensed for the sake of brevity. The "infant foods," from No. 1 to 5 inclusive, are designated by the author as "Bisquit Kindermehle," which he understands to be composed, after Nestle's method, of baked wheat flour and condensed milk. The foods from No. 6 to 12 are supposed to be arbitrary combinations; No. 6 being the author's "Lacto-Leguminose," and No. 7, H. Von Liebig's Malto-Leguminose. Dr. N. Gerber's Lacto-Leguminose is not to be confounded with the infant food of Gerber & Co. (No. 2.)

Condensed Milk.

Number.	CONDENSED MILK.	Water and volatile matter.	Salts.	Fats.	Albuminates.	Sugar.	ANALYST.	Year.
1	Anglo-Swiss Cond. Milk Co. (Cham.).....	26.14	2.05	9.92	11.90	50.80	Dr. N. Gerber.	1875-6-7 (average.)
2	Swiss Cond. Milk Co. (Freiburg.).....	24.70	2.11	6.02	9.77	57.40	Dr. F. Soxhlet.	1878
3	Gerber & Cie. (Thun.)...	25.75	2.15	10.66	13.41	48.02	Dr. N. Gerber.	1879
4	H. Nestlé. (Vivis.).....	26.10	2.12	9.46	11.78	50.59	Dr. N. Gerber.	1878
5	Norwegian Cond. Milk Co. (Christiana.).....	25.10	1. 4	6.83	10.46	55.67	v. Fellenberg.	1878
6	Milk-condens. Co. of Kempten, Bav.....	25.28	2.03	8.62	10.25	53.82	Dr. F. Soxhlet.	1878
7	Vienna Fact'y. (Hernals.)	32.80	3 01	9.08	13.13	41.25	Dr. N. Gerber.	1877
8	Italian Cond. Milk Co. (Milan.).....	30.08	2.01	7.54	9.02	51.35	Dr. F. Soxhlet.	1878
9	New York Cond. Milk Co. (Gall Borden.).....	31.03	2.56	10.19	12.53	48.42	Dr. N. Gerber.	1879
10	American Cond. Milk Co. (Alderney.)	24.26	2.16	9.63	10.82	53.13	Dr. F. Soxhlet.	1878
11	Hooker's Cream Milk. (London.).....	26.88	2.26	8.67	11.07	51.12	Dr. F. Soxhlet.	1878
12	West End of England Milk Co. (Swindon Mills.).....	27.72	1.81	8.61	9.92	51.84	Dr. N. Gerber.	1877
		23.38	1.56	9.23	10.22	51.57	Dr. N. Gerber.	1877
		26.45	1.76	9.84	10.56	51.38		
		28.89	1.62	10.45	12.56	46.48		

Infant Foods. (Kindermehle.)

Number.	INFANT FOODS.	Water and volatile substance.	Salts.	Fats.	Albuminates.	Carbohydrates		ANALYST.	Year.
						Soluble in cold water	Insoluble in cold water.		
1	H Nestlé. (Vivis.)...	5.80	1.7	3.67	9.50	83.80		Dr. Müller.	
			2.17		9.85	41.16	37.85	Dr. N. Gerber.	1879
		6.36	(0.209 PO ₅)	4.75	10.96	76.08		Physiolog. Inst. (Leipzig.)	1878
2	Gerber & Co. (Thun.)	4.39	1.45	4.75	13.69	75.72		v. Fellenberg.	1878
3	Anglo-Swiss Cond. Milk Co. (Cham.)	5.84	1.74	5.02	10.33	43.51	33.55	Dr. N. Gerber.	1878
4	Giffey, Schiele & Co (Eppingen, Baden.)	7.79	1.46	5.44	8 84	48.50	27.95	Dr. Radenhaus'n	1879
5	Faust & Schuster. (Göttingen.)	4.22	1.78	4.34	12.86	47.68	29.94	Dr. N. Gerber.	1877
6	Dr. N. Gerber.....	6.29	1.76	5.03	10.71	48.62	27 59	Dr. N. Gerber.	1877
		6.63	1.85	4 75	10.96	39.12	34.70	Dr. Flügge.	1877
		4.50	2.3	5.06	18 to 20	70.65		Dr. N. Gerber.	1879
7	H. v. Liebig.....	9.42	3.01	1.34	20.47	16.25	49.41	Dr. N. Gerber.	1879
8	Liebig's Kindersuppe.	40.44	1.71	0.82	8.41	48.61		Dr. N. Gerber.	1877
9	Dr. Frerich.....	7.32	2.45	0.26	14.88	77.09		Dr. F. Soxhlet.	1879
			(0.69 PO ₅)						
10	Sambuc. (Dextrin-flour.....)	6.39	2.00		16.80	53.20	21.50	Dr. Hager.	1878
		6.53	1.04	0.88	10.12	52.42	29.23	Dr. N. Gerber.	1877
11	Dr. Ridge. (London.)	3.98	1.01	0.62	10.59	63.50	17.75	Prof. Piccard.	1877
12	Dr. Coffin. (N. Y.)...	3.98	1.13	1.95	9.05	8.12	75.47	Dr. N. Gerber.	1877
		8.29	3.02	1.59	17.15	35.12	34.82	Dr. N. Gerber.	1877

Infant Food.—A food for infants that has attracted some attention in Europe, has been analyzed by Dr. Skelweit, and is found to contain the following ultimate components: Protein substances, 9.26 per cent.; fat, 5.60 per cent.; carbohydrates, 77.40 per. cent.; moisture, 5.30 per cent.; ash, 2.44 per cent. It is favorably mentioned by Dr. Hager, and appears to have been used with satisfaction and success.—Ph. Centralh., December 5th, 1878, p. 460.

Wheys.—The following formulas for preparing wheys with various agents are given in Drug. Circ. (May, 1879, p. 92):

Common Whey.—1500 parts of milk, heat to boiling, and add 15 parts of vinegar. Strain. Or, instead of vinegar, use $1\frac{1}{2}$ parts of tartaric acid.

Sour Whey.—1500 parts milk and 15 parts cream of tartar.

Effervescing Whey.—1000 parts common whey are poured into a bottle containing 7 parts bicarbonate of sodium and $5\frac{3}{10}$ parts tartaric acid in crystals. Cork and put in a cool place.

Ferrated Whey.—700 parts milk and $3\frac{1}{2}$ parts solution of acetate of iron; or, dissolve in 500 parts common whey $1\frac{1}{2}$ parts citrate of iron and ammonia.

Mustard Whey.—1500 parts milk are heated with 75 parts ground black mustard till coagulated. Strain.

Tamarind Whey.—1400 parts milk, heat to boiling. Add 40 parts tamarind pulp, diluted with 40 parts hot water. Strain when cold.

Alum Whey.—1000 parts milk and 10 parts alum.

Wine Whey.—1000 parts milk and 250 parts hock.

Vitriolated Whey.—1400 parts milk and $3\frac{1}{2}$ parts diluted sulphuric acid.

Canned Food—Presence of Tin.—Mr. Albert E. Menke, having observed that corrosion had taken place in a tin can of pine-apples at the point where it had been soldered, examined the syrup and found indications of tin. This was quantitatively determined to be present to the amount of 0.151335 gram in a can which contained $1\frac{1}{2}$ lbs. Lobster and apples in tin cans also were found to contain tin, to a smaller amount, however.—Ch. News, July 5th, 1878, p. 5.

Pressed Herbs, etc., in Tins.—C. Schneider has found it useful to adopt the American method of pressing herbs, etc., but instead of enveloping the vegetable substances in paper he presses them

into tin canisters made for the purpose. The substance is dried until it becomes friable, and is then pressed into the canisters *while still warm*, in small quantities at a time. Even the narcotic herbs are thus kept perfectly for several years. Mr. Schneider considers this method not only cheaper than the American method, since the tin canisters can be employed for the purpose for an indefinite time, but he considers also that the herbs, being completely protected from moisture, will keep much better than when they are enveloped in paper.—Arch. f. Phar., September, 1878, p. 241.

Lister's Bandage—Improved Method of Preparing.—Dr. Paul Bruns has improved the method of preparing Lister's carbolated gauze. This, as is well known, is produced by immersing gauze in a hot mixture composed of 1 part pure carbolic acid, 5 parts resin, and 7 parts of paraffin; the impregnated gauze is then passed, in several layers, through rollers, and consequently requires special machinery. Dr. Bruns produces it now by immersing cotton-gauze, previously deprived of fat, in a solution of 100 grams carbolic acid, 400 grams powdered resin, and 40 grams castor oil, in 2 liters of alcohol. The gauze is well kneaded, so as to become thoroughly imbued with the solution; it is then stretched out horizontally, when, in the course of half an hour, the carbolated gauze will be dry. 1 kilo (about 25 meters) of cotton-gauze requires about $2\frac{1}{2}$ liters of the above solution. The product is much softer and pliable than that made by the original method, and possesses another advantage in being free from paraffin, which in many cases irritates the skin. It may, after use, be boiled in caustic lye and again impregnated.

Benzoic Acid and Salicylic Acid Gauze may be prepared in a similar manner. To $2\frac{1}{2}$ liters of alcohol, 50 grams benzoic (or salicylic) acid and 20 grams castor oil (or 10 grams each of castor oil and resin) are used. This constitutes a 5 per cent. benzoic acid gauze, and is the quantity required for 1 kilo. It may be made just double the strength, in which event the castor oil (and resin) are also doubled. The use of castor oil in connection with the latter prevents the dusting off and consequent irritation produced by the medicinal agents, and is superior to the glycerin recommended by Thiersch for the same purpose.—Ph. Centralh., September 12th, 1878, p. 345.

Borated Lint and Cotton.—Dr. Ed. Solger prepares these by saturating lint or cotton with aqueous solutions of boric acid,

and drying. The solutions are prepared of strength corresponding to 10, 15, and 20 per cent. of boric acid, heat being applied to effect solution, and maintained during the immersion of the substance.

Boro-carbolated Lint and Cotton are prepared similarly from solutions containing 5 to 10 per cent. boric acid, 2 per cent. carbolic acid, and 5 per cent. alcohol.—Ph. Centralh., December 19th, 1878, p. 412.

Antiseptic Dressings—Simple Method of Preparation.—Mr. E. W. Eilau communicates the following method whereby, at a comparatively small expense, an antiseptic dressing is obtained readily and conveniently, which is equal in purity and quality to that found in the market and sold at twenty-five cents per yard. Melt 4 oz. boiled linseed oil, 2 oz. yellow wax, and 4 oz. rosin together, then add 8 oz. spirit of turpentine and 1 oz. Calvert's carbolic acid No. 2. Then take a piece of tarlatan, 16 yards long by 2 yards wide, and immerse it in this mixture while still fluid. Pass the material through an ordinary clothes-wringer three or four times, or until no more of the mass can be squeezed out, then fold it and wrap it in oiled silk or carbolized paper, and preserve it in a tin box carefully secluded from the air, to prevent the evaporation of the carbolic acid. The material so produced is soft, pliable, and does not become sticky when applied to the body.—New Rem., April, 1879, p. 108; from Maryland Med. Jour.

Protection against the Inflammability of Clothing.—A recent accident by fire among the female operatives of a Dresden establishment caused Mr. Siebdrath to make a series of experiments with the purpose of rendering clothing fire, or rather, flame-proof. Alum in 5 and 10 per cent. solution was found to be unsatisfactory, but a 5 per cent. solution of phosphate of ammonium answered the purpose completely. Linen and cotton goods saturated with such a solution and dried, will no longer burn with flame; they are simply charred. By washing, etc., they may lose this property, but the cost of restoring them is trifling.—Ph. Centralh., August 8th, 1878, p. 301.

Fireproof Paper.—The following is said to produce a paper which is not destroyed when exposed to the heat of an ordinary fire: 1 part vegetable fibre, 2 parts asbestos, 0.1 part borax, 0.2 parts alum. These ingredients are ground to a very fine pow-

der, converted with water to a magma of the proper consistence, and into paper in the usual manner.

Fireproof Ink, which may be used for writing as well as printing, is made as follows: 90 grams of finely-ground and sifted graphite, 0.75 gram copal or other similar resin, 8.0 to 10.0 grams sulphate of iron, 30.0 to 32.0 grams of tincture of galls and indigo carmine; the substances are well mixed and boiled in water. If colored ink is required, the graphite is substituted by some other mineral pigment.—Ph. Centralh., November 7th, 1878, p. 428.

Perfumed Carbolic Acid.—Carbolic acid, 1 part; oil of lemon, 3 parts; alcohol at 36°, 100 parts. Mix. In this mixture, which appears to be quite perfect and stable, the odor of lemon alone is perceptible. It constitutes what has been known as "Lebon's Perfumed Carbolic Acid," the formula for which had long been kept secret, but has now been made known in the "Moniteur Scientifique" of Paris. The antiseptic properties are in no way affected by the oil of lemon.—Drug. Circ., October, 1878, p. 167.

Carbolate of Iodine.—The following formula is furnished by an agent of the "patent pocket inhaler," according to the statement of a correspondent in the "Pharmaceutical Journal:" Carbolic acid, 45 parts; camphor, 10 parts; acetic acid, 8 parts; alcohol, 10 parts; iodine, 1 part; water, 25 parts; oil of cassia, 1 part.

Dr. C. F. Holtz's original formula, for use as an inhalation in diphtheria is: Crystallized carbolic acid, 1 fluid drachm; alcohol, 1 fluid drachm; water, 5 fluid drachms; tincture of iodine, 4 fluid drachms.—New Rem., May, 1879, p. 158.

Antiseptic Balsam.—According to "New Remedies" (November, 1878, p. 347), the formula for Dr. I. Felix's "Cicatrizing and Antiseptic Balsam" is as follows: Pure liquefied carbolic acid, 4 parts; hydrochlorate of morphia, 1 part; tincture of arnica, tincture of aconite, of each 10 parts; Peruvian balsam, 25 parts; glycerin, 50 parts. Mix. Said to be an excellent application to malignant ulcers.

Wash for Chilblains.—The following is recommended in "Lancet" as a good wash for the hands and feet affected with chilblains: Sulphuric acid, 3 drachms; glycerin, water, of each 1 drachm. Mix. This acid wash is particularly useful in the irritating, tormenting stage of chilblains.—Drug. Circ., February, 1879, p. 47.

Russian Remedy for Freckles.—Sulphocarbolate of zinc, 1

drachm ; oil of lemon, 1 drachm ; alcohol, 5 drachms ; collodion, 45 drachms. Mix. To be applied with a camel's-hair brush.—Drug. Circ., September, 1878, p. 150.

Vauquelin's Anti-asthmatic Cigarettes.—The following formula is given in "New Remedies" (November, 1878, p. 347): Arseniate of sodium, 3 grains ; extract of belladonna, 8 grains ; extract of stramonium, 8 grains. Dissolve the arseniate of sodium in a small quantity of water, rub it with the two extracts, then soak up the whole mixture with fine blotting-paper, which is dried and cut up into 24 equal parts. Each part is then rolled up in a piece of cigarette paper.

Four or five inhalations from one cigarette are generally sufficient as a dose.

Depilatory.—Sulphide of calcium has long been known as an efficient means of removing hairs from parts of the living body, or from furs, etc. It may be prepared without trouble by passing a current of sulphuretted hydrogen through a thin milk of lime, prepared from fresh caustic lime, until it is saturated. 10 parts of this hydrated calcium sulphide are mixed with 5 parts of starch and dextrin, together with a little oil of lemon, to a thick paste, which is spread upon the part to be deprived of hairs. After about twenty minutes, it has destroyed the latter and may be removed with a spatula.—New Rem., March, 1879, p. 84 ; from Neuste Erf. u. Entd.

Phosphorus Paste.—The following formula is the result of numerous experiments by Dr. E. Mylius, and produces a phosphorus paste that approximates in its character and good qualities very closely to that of Steiner. But in order to succeed, the author observes, it is necessary to follow his formula, word for word, and the greatest attention must be given to the production of a smooth starch paste. 800 parts of wheat starch are stirred with 5000 parts of water, and converted into paste by *very gradual* heating to 100° C. (= 212° F.), the paste being stirred until it has cooled to 30° C. (= 86° F.). 150 parts of phosphorus are dissolved in 60 parts of bisulphide of carbon, the solution is added to a mucilage, composed of 10 parts of gum arabic, 15 parts of gum tragacanth, and 150 parts of water, contained in an emulsion mortar, and an emulsion is produced by careful trituration and beating. This emulsion of phosphorus is then added to the paste, which must be cooled to at least 30° C. (= 86° F.) and

carefully mixed. It is then immediately put in opodeldoc bottles, which have been previously fitted with corks. If the phosphorus paste is to be colored, a color must be selected that is capable of withstanding the action of acids or oxidizing agents. It is added to the starch in the beginning. For blue, molybdenum blue, smalts, or Prussian blue; for green, Lignet's green is the most suitable.—*Zeitschr. Oest., Ap. Ver.*, June 10th, 1879, p. 263.

Perfumery.—Mr. C. R. Avery, of Brooklyn, has contributed the following receipts to "*Drug. Circ.*" (August, 1878, p. 135):

Diamond Tooth Powder.—Precipitated chalk, 3 pounds; powdered myrrh, 4 ounces; powdered sugar, 1 pound; powdered white castile soap, 8 ounces; oil of wintergreen, sufficient.

Portugal Cologne.—Oil of orange-peel, 8 ounces; oil of lemon, 2 ounces; oil of bergamot, 1 ounce; oil of rose, 2 drachms; alcohol, 1 gallon.

Heliotrope Sachet Powder.—Powdered orris-root, 1 pound; vanilla beans, 4 ounces; benzoin, 1 ounce; musk, 5 grains; civet, 15 grains; oil of rose, 10 drops; oil of bitter almonds, 10 drops.

Musk Sachet Powder.—Powdered orris-root, 2½ pounds; grain musk, 30 grains; oil of rose, 30 grains.

Verbena Sachet Powder.—Powdered orris-root, 2 pounds; oil of verbena, 40 drops; oil of rose, 20 drops; civet, 20 grains.

White's Eau de Cologne.—Oil of bergamot, 1 ounce; oil of lemon, 2 ounces; oil of orange, 2 ounces; oil of rosemary, 1 ounce; oil of neroli, 2 drachms; oil of rose geranium, 4 drachms; oil of cloves, 2 drachms; extract of musk, 1 ounce; orange flower water, 1 pint; alcohol, 1 gallon.

English Lavender-water.—Alcohol, 40 ounces; essence of millefleurs, 1 ounce; essence of violet, 10 drachms; essence of jasmine, 1 ounce; extract of musk, 1 ounce; oil of bergamot, 2 drachms; oil of cloves, 10 drops; oil of rose, 20 drops; oil of lavender (English), 1 ounce.

French Lavender-water.—Alcohol, 8 gallons; oil of lavender, 16 ounces; oil of bergamot, 8 ounces; oil of lemon, 4 ounces; oil of cloves, 1 ounce; oil of rose, 1 ounce; extract of musk, 8 ounces; extract of ambergris, 2 ounces.

New Favorite Odors.—Mr. G. Dubelle has originated the following odors, which, he states, are well approved:

Lady Hayes's Bouquet.—Extract of violets, 40 fluid ounces; do. tuberose, 10 fluid ounces; do. cassia flowers, 10 fluid ounces; do.

ambergris, 2½ fluid ounces; oil of rose, ¼ fluid ounce; do. neroli, bergamot, lavender, each ¼ fluid ounce.

Lucca Bouquet.—Triple extract of roses, extract of jasmine, do. jonquil, of each 20 fluid ounces; do. violets, do. ambergris, of each 10 fluid ounces; oil of neroli, 1½ fluid drachms; do. rose, 1 fluid drachm; do. lavender, ½ fluid drachm.

Charlotte Cushman Bouquet.—Triple extract of roses, 32 fluid ounces; do. tuberoso, 24 fluid ounces; do. orris, 12 fluid ounces; do. ambergris, 4 fluid ounces; do. musk, 2 fluid ounces; oil of bergamot, 1 fluid ounce; do. lemon, ¼ fluid ounce.

Clara Kellogg Bouquet.—Extract of tuberoso, 20 fluid ounces; do. violets, 16 fluid ounces; do. roses, 16 fluid ounces; do. vanilla, 8 fluid ounces; do. Tolu, 4 fluid ounces; do. ambergris, 4 fluid ounces; oil of neroli, 1 fluid drachm; do. lemon, ½ fluid drachm.

Sweet Gem of Eden.—Extract of jasmine, 20 fluid ounces; do. tuberoso, 16 fluid ounces; do. orange flowers, 4 fluid ounces; do. jonquil, 4 fluid ounces; triple extract of roses, 4 fluid ounces; extract of acacia flowers, 4 fluid ounces; do. vanilla, 3 fluid ounces; do. civet, 1 fluid ounce; oil of bergamot, 1 fluid ounce.

Pearl of Savoy.—Triple extract of roses, 24 fluid ounces; do. jasmine, 20 fluid ounces; do. violets, 16 fluid ounces; oil of cedrat, 3 fluid drachms; do. citron, 3 fluid drachms; do. neroli, 2½ fluid drachms; do. cinnamon, 1 fluid drachm; extract of musk, 3 fluid drachms; do. ambergris, 2 fluid drachms.

Cuir de Russie.—Triple extract of roses, do. violets, do. jasmine, do. neroli, of each 20 fluid ounces; do. white rose, 16 fluid ounces; do. musk, do. ambergris, of each 1 fluid ounce; oil of bergamot, do. citron, of each ½ fluid ounce.

Stolen Kisses.—Extract of jonquil, do. orris, of each 40 fluid ounces; do. acacia flowers, triple extract of roses, do. tonquin, of each 20 fluid ounces; do. ambergris, do. civet, of each 5 fluid ounces; oil of citron, 2 fluid drachms.

Fairmount Park.—Extract of violets, do. neroli, do. cassia flowers, of each 20 fluid ounces; do. tuberoso, do. jasmine, do. geranium rose, of each 10 fluid ounces; do. musk, do. ambergris, of each 4 fluid ounces.

Pink Domino.—Extract of acacia flowers, 20 fluid ounces; do. jasmine, triple extract of roses, do. orange flowers, do. tuberoso, of each 10 fluid ounces; do. ambergris, 5 fluid ounces.—Drug. Circ., September, 1878, p. 161.

Florida Water.—The following formula is said to be satisfactory: Oil of bergamot, 4 ounces; oil of lemon, 6 ounces; oil of cloves, 6 drachms; oil of lavender, 1 ounce; alcohol, 3½ gallons; water, 6 pints. Mix the oils and alcohol; add water after two days.—New Rem., March, 1879, p. 90.

Liqueurs—Removing Fusel Oil and Clarification.—According to the "Brennerei Zeitung," liqueurs containing fusel oil may be entirely freed from it by shaking about 8 liters of the liquor with a powder composed of 30 grams of starch, 150 grams of dried and powdered albumen, and 15 grams of sugar of milk. After shaking the mixture is allowed to settle, and is decanted clear. Even when potato whiskey has been used for the preparation of the "liqueur," the fusel oil will be completely removed by the process.—Ph. Centralb., May 15th, 1879, p. 205.

Black Leather Varnish—Preparation.—R. Henning makes some interesting remarks (Chem. Centralbl., 1878, 317–319) on the preparation of the so called "blue varnish" used in the preparation of varnished leather. The preparation of this varnish forms the only secret of the whole manufacture. After drying, if of good quality, it should be flexible, elastic, and yet resistible, not sticky, fine black, and shiny, and should not crack or strip off after exposure to the cold or after long wearing. It is difficult, however, to obtain varnish with all these properties, success depending greatly on the manner of drying the leather after treatment, and on the knowledge of the reactions which take place during this operation, also of the fatty oils, their conversion and decomposition products. Linseed oil mostly forms the base of leather varnishes, a very clear and old oil free from water being used. The drying of all oil-varnishes is a process of oxidation, the oils being converted by the oxygen of the air into tough, transparent, and more or less caoutchouc-like bodies. To facilitate this oxidation, the oil is boiled with substances which readily give up oxygen. It is bleached if light varnishes are required. Palmitin, which is present in most drying oils, hinders the drying process considerably, and removes the fine lustre of the lacquer formed. This fat is removed by fuming nitric acid, palmitic acid and glycerin being formed, the former being subsequently separated as a lead or manganese salt. If the oil is not clear or not very old, and contains water, a previous treatment with concentrated sulphuric acid is necessary, or, still better, to allow it to

stand for fourteen days with a concentrated solution of ferric sulphate with frequent stirring. The purified oil is then heated to 100°C. ($=212^{\circ}\text{F.}$), and treated with a saturated solution of permanganate of potassium (2 grams to 1 kilo of oil). When the mixture assumes a brown color the temperature is raised to 130°C. ($=266^{\circ}\text{F.}$), and boiling continued until all the water present has been expelled. Prussian blue is now added in the form of an extremely fine powder ($\frac{1}{4}$ to 1 kilo to 10 kilos of oil). After two to three hours' heating a portion of the mass is painted on writing-paper. If on cooling a deep-brown shiny layer is formed on the paper, the operation is finished. For especially fine lacquer, 10 kilos of oil require 300 grams of finely-powdered gamboge. The latter is added after the completion of the above process, the mixture being heated to 150°C. ($=302^{\circ}\text{F.}$) for two hours. The temperature is then lowered slowly. Instead of grounding with lampblack and oil of turpentine, it is better to use an alcoholic solution of anilin blue, in which case the reddish-brown tinge always observed with the former mixture will not be noticed.—*J. Chem. Soc.*, October, 1878, p. 827.

Liquid Blacking.—The following formula is given in “*Drug. Circ.*” (August, 1878, p. 147): Borax, 6 ounces; shellac, $1\frac{1}{2}$ ounces; extract of logwood, 6 ounces; bichromate of potassium, 3 drachms; water, 2 gallons. Dissolve the extract in 1 gallon of warm water, boil the shellac and borax in a gallon of water till they are dissolved. Mix the two solutions, and add the bichromate of potassium.

Liquid Blue from Alkanet-root.—Alkanet-root, 1 ounce; carbonate of sodium, 1 ounce; water, $6\frac{1}{2}$ ounces; alcohol, $2\frac{1}{2}$ ounces. Digest together. The result is a deep-blue tincture that can be used for coloring various syrups, liquors, etc.—*Drug. Circ.*, February, 1879, p. 47.

Ineradicable Ink.—The “*Apotheker Zeitung*” gives the following formula: 1.75 grams anilin black are ground up with 60 drops of hydrochloric acid and 42 grams of alcohol, and the liquid is diluted with a hot solution of 2.5 grams of gum arabic in 170 grams of water. If the anilin black solution is diluted with a solution of 2.5 grams of shellac in 170 grams of alcohol instead of the gum-water, the result is an ink suitable for writing on wood, brass, or leather.—*Chemiker Zeit.*, May 8th, 1879; in *Ch. News*, June 13th, 1879, p. 263.

Braconnot's Non-erasible Ink.—This is prepared by mixing 20 grams caustic potassa, 10 grams leather scraps, cut fine, and 5 grams of sulphur in an iron kettle on a sand-bath, covering with water, evaporating to dryness, and continuing the heat, with continual stirring, until the mixture again becomes pasty. This mass is then dissolved in water, strained, and preserved in well-stoppered bottles. The product resists all chemical agents.—Ph. Centralh., June 19th, 1879, p. 244; from An. de Ch. et de Phys.

Stamping Ink, suitable for rubber stamps, may be made as follows: Dissolve one part of crystallized red anilin violet in thirty parts of alcohol, and add to the solution thirty parts of glycerin. This color is poured on the cushion and rubbed in with a brush or something equivalent. Other colors may be treated in the same manner.—“Random Notes,” in Drug. Circ., April, 1879, p. 79.

Writing Pencils for Glass.—Stearin, 20 p.; suet, 15 p.; bees-wax, 10 p. Melt, and add finely-powdered red lead, 30 p.; dry carbonate of potassium, 5 p. Let stand in a warm place, stirring occasionally, for an hour, and pour out in glass tubes.—Drug. Circ., March, 1879, p. 61.

Bronzing Fluid.—Metallic objects may be covered with a bright-brown bronzing by applying the following solution with a brush: 10 p. fuchsin and 5 p. anilin purple are dissolved in 100 p. 95° alcohol on a water-bath; 5 parts benzoic acid are then added, and the whole is boiled five or ten minutes, until the greenish color of the mixture has changed to bronze-brown. It may be used for coloring other substances than metals.—Ph. Centralh., October 31st, 1878, p. 416.

Enamel for Cast and Wrought Iron.—Th. Raetz recommends the preparation of enamel for ironware as follows: 130 p. finely-powdered crystal glass, 20.5 p. calcined soda, and 12 p. boric acid are melted together, powdered, and stored for use. The enamel produced by this mixture is glassy, transparent, and adheres well even to tinned iron. Several layers of enamel may also be used. For this purpose a so-called *ground mass*, which runs imperfectly, is first put on, and then the so-called “*covering mass*,” which imparts smoothness and glaze, is put on. The “ground mass” is composed of 30 p. finely-powdered feldspar and 25 p. borax, which are melted together, powdered, and mixed with 10 p. clay, 6 p. feldspar, and 1.75 p. carbonate of magnesium. The “ground

mass" is applied by making it into paste with water, spreading it evenly over the surface; the "covering mass," in powder, is then strewn over it, the whole is dried carefully, and baked in a muffle-furnace. The latter mass is obtained by melting together 37.5 p. powdered quartz, 27.5 p. borax, 50 p. oxide of tin, 15 p. soda, and 10 p. saltpetre.—Ph. Centralh., November 14th, 1878, p. 438.

MATERIA MEDICA.

Buchheim's Pharmacognostic System.—Professor R. Buchheim reviews the various pharmacognostic systems that have been in use or proposed, and is of the opinion that vegetable drugs, from whatever source, or whatever part of the plant, etc., they are obtained, should be classified according to their most prominent medicinally active constituent. The following is the classification which the author has adopted for some years in his courses of lectures on pharmacognosy:

I. GROUP OF THE CARBOHYDRATES.

A. *Group of the Starches.*

This includes the various officinal starches, Iceland moss, dextrin, inulin, etc.

B. *Group of the Sugars.*

Comprising the various kinds of sugar, honey, as well as drugs used on account of the sugar they contain.

C. *Group of the Gums and Mucilages.*

Gum arabic, tragacanth, drugs containing gum or mucilage abundantly, etc.

II. GROUP OF THE ALBUMENS AND DERIVATIVES.

A. *Group of Albumens.*

Comprising serum-albumen, egg-albumen, casein, etc.

B. *Group of the Albuminoids.*

Gelatin, isinglass, and other bodies that may be regarded as derivatives of albumen, though differing from it in their behavior.

C. Group of the Putrid Bodies.

By virtue of their extremely complicated composition, the albuminous bodies are capable of yielding a large series of decomposition products. In the healthy animal organism they undergo certain changes by which they are split into bodies of a simpler constitution, such as urea, uric acid, etc. Under certain conditions, however, abnormal products of the decomposition of albuminous bodies may be produced, and such the author designates as "putrid bodies." To these belong the poisons produced by the putrefactive decomposition of animal substances, the poison of rabies, cesspool poison, etc. Ergot may also be included among the bodies; probably also musk and castoreum.

III. GROUP OF THE GLYCERIDES.

A. Olive Oil Group.

This group includes most of the important fats—ol. olivarum, ol. amygdalarum, ol. papaveris, ol. lini, ol. cacao, as well as the seeds rich in oil; animal fats, lard and suet; lycopodium, which owes its virtues chiefly to fat, etc.

B. Croton Oil Group.

This includes croton oil, castor oil, the oil of the seeds of *Aleurites triloba*, Forst., and of *Jatropha curcas*, L., etc.

IV. THE CARDOL GROUP.

Drugs containing cardol ($C_{21}H_{30}O_2$)—the fruits of *Anacardium occidentale*, L., of *Semecarpus anacardium*, L., the milky juice of *Rhus toxicodendron*, L., *Rhus typhina*, L., etc. To this group also belong other acrid drugs, such as capsicum (capsicol), grains of paradise (paradisol), ginger (zingiberol), etc.

V. THE MUSTARD OIL GROUP.

To this group belong a series of compounds derived from iso-sulphocyanic acid.

VI. CANTHARIDIN.

This stands isolated, since no substance has yet been determined that can be placed with it.

VII. GROUP OF ACID ANHYDRIDES.

By the name of "anhydrides" certain substances are designated, which, though not in themselves acid, are readily converted into acids by taking up water.

A. *Euphorbic Acid Anhydride Group.*

Euphorbium, Mezereon-bark, Silphium cyrenaicum, Thapsia silphium, Viv., Anemone pratensis, L., A. pulsatilla, L., various species of Ranunculus, etc., belong to this group.

B. *Convolvulinic Acid Anhydride Group.*

Rad. jalapa, and various other species of Convolvulus and Ipomœa, Podophyllum, Elaterium, belong to this group. Gamboge, though not containing an anhydride, may be considered here.

VIII. THE ALOETIN GROUP.

The various Aloes, Colocynth, Bryonia, etc., may be embraced in this group.

IX. CATHARTIC ACID GROUP.

Senna, Rhubarb, Buckthorn, etc.

X. FILICIC ACID GROUP.

Filix mas, Kousso, Kamala, probably also Pomegranate-bark. Santonica may be considered under this head as addenda.

XI. TANNIC ACID GROUP.

This comprises the drugs containing tannin as a prominent medicinal component. Galla, Quercus, Uva ursi, Krameria, Tormentilla, Catechu, Kino, Cortex fructus juglandis, though not containing a large quantity of tannin, contains a substance having much resemblance to pyrogallol, and may be considered in this connection.

XII. ALKALOID GROUP.**A. *Piperin Group.***

Pepper, Pyrethrum.

B. *Quinia Group.*

Cinchona barks.

C. *Caffeia Group.*

Coffee, Tea, Cacao.

D. Conia Group.

Conium.

*E. Strychnia Group.*The drugs obtained from various species of *Strychnos*.*F. Morphia Group.*

Opium; Lactucarium, etc., as addenda.

G. Atropia Group.

Belladonna, Datura, Duboisia, Hyoscyamus, etc.

*H. Pilocarpia.**I. Physostigmia.**K. Nicotia.**L. Emetia.**M. Aconitia Group.*Aconite, Delphinium; probably also *Sanguinaria*.*N. Veratria Group.**O. Colchicia.*

XIII. THE GLUCOSIDE GROUP.

*A. Digitalin Group.*Digitalis, Squill, Hellebore, Antiaris, Convallaria, Nerium Oleander, *Tanghinia venenifera*, *Strophantus hispidus*, etc.*B. Saponin Group.*Saponaria, Smilax, Senega, Dulcamara, Burdock, *Viola tricolor*, etc.

XIV. THE GROUP OF BITTER PRINCIPLES.

This includes all the principles, whether glucosides or not, that possess a strongly bitter taste.

XV. THE ESSENTIAL OIL GROUP.

XVI. THE GROUP OF OFFICINAL INDIFFERENT RESINS.

XVII. THE GROUP OF OFFICINAL COLORING MATTERS.

—Arch. d. Ph., June, 1879, pp. 481–519.

a. Vegetable Drugs.

ALGÆ.

Sea-weed—Comparative Value for Iodine Manufacture, etc.—
In connection with their very interesting exhibit, illustrative of

the iodine industry in France, Messrs. Pellieux & Mazé-Launay, of Kerhuon, France, furnish some very noteworthy information as to the raw materials used. Of the four or five hundred kinds of sea-weeds that are met with on the west coast of France, only about a dozen species are, from their size and abundance, worth collecting for this purpose. These are *Fucus vesiculosus*, *F. nodosus*, *F. serratus*, *Halidrys siliquosa*, *Himanthalea lorea*, *Laminaria bulbosa*, *L. saccharina*, *L. digitata*, var. *stenoloba* and *stenophylla*, and *Alaria esculenta*. Each of these has its habitat at a definite depth below the surface of the water, and, with the exception of *L. bulbosa*, which as collected off the Finistère coast, is nearly devoid of iodine, these algæ are superposed in the inverse order of their richness in iodine. Taking *L. digitata*, var. *stenophylla*, as the standard for 100, the following table represents the average relative richness of the other kinds:

<i>Laminaria digitata</i> , <i>stenoloba</i> , new frond,	122.89
“ “ “ stalk,	109.33
“ “ “ old frond,	58.03
“ “ “ entire plant,	66.16
“ “ <i>stenophylla</i> , “	100.00
“ <i>saccharina</i> , “	45.08
<i>Fucus vesiculosus</i> , <i>F. nodosus</i> , <i>F. serratus</i> , and <i>Halidrys</i>	
<i>siliquosa</i> , average,	12.14
<i>Alaria esculenta</i> ,	10.84
<i>Laminaria bulbosa</i> ,	7.83

The richness in iodine of a species, however, varies with the place and conditions of its growth; as a rule, rapidity of growth is adverse to richness in iodine. Temperature, therefore, plays an important part in the assimilation of iodine by sea-weeds; those growing on the coasts of Ireland and Scotland yield more than those growing on the coast of Brittany, and even on the coast of France the *L. digitata* from Finistère contains nearly six times as much iodine as the same species from Noirmontier, a couple of degrees further south. The richness in iodine will also vary as much as 40 per cent. in the same plant, according to the part of the plant, its age and the season, the maximum richness being attained in the winter, and the minimum yield corresponding with the months of June, July, and August. Thus, *L. digitata*, var. *stenoloba*, taking the quantity in the new frond as 100, that in the old frond still attached to it would be represented by 47.22, and the stalk by 88.97.

The following table, showing the yield of kelp and iodine by different kinds of sea-weed, is based upon a number of laboratory experiments, but of course such favorable results are not attained in manufacturing operations:

	Sea-weed required for 1000 parts of kelp.	Soluble matter for 1000 parts of kelp.	Iodine per 1000 parts of sea-weed.	Iodine per 1000 parts of kelp.
Laminaria digitata, stenoloba :				
New fronds.....	18,752	582	1 224	22.952
Stalks.....	16,988	527	1 089	18.500
Old fronds.....	16,166	502	0.578	9.344
Entire plants.....	20,095	765	0.606	12.177
Laminaria digitata, stenophylla....	20,255	714	0.996	20.174
Laminaria saccharina.....	18,906	711	0.448	8.470
Alaria esculenta.....	21,080	700	0.108	2.277
Fucus vesiculosus. } Fucus nodosus. } Fucus serratus. } average.....	16,456	507	0.121	1.991
Halidrys sillquosa. }				
Himanthalia lorea.....	16,401	720	0.087	1.443
Laminaria bulbosa.....	21,565	738	0.077	1.660

The fresh sea-weed, gathered from the place of its growth, is considered by Messrs. Pellicieux & Mazé-Launay to be most valuable, as the drift sea-weed always becomes rapidly impoverished in iodine by the action of the sea-water; after two days it will not contain more than 59 per cent. of the iodine present in it at the time it became detached, and after ten days only about 7 per cent. will remain. On the east coast of Finistère about 1000 to 1200 boats are employed in the collection, the men being provided with long staves with which to detach the weeds from their place of growth. Another considerable cause of loss of iodine is the exposure of the sea-weed to wind and rain during the drying for the ordinary operation of kelp burning. The manner of avoiding this loss, to some extent, will be found under Iodine.—“The Paris Exhibition,” in Ph. J. Trans., October 19th, 1878, p. 303.

Forphyra Vulgaris.—This sea-weed, commonly called *Laver* on our eastern coast, and found in nearly all parts of the world at low tide, is used as food by many of the Indians along the Pacific Coast, being cooked as greens, or with meat. It is also much relished by Chinamen, and is quite an article of commerce. The Chinamen residing along the coast, at low tides gather this plant, which is easily taken from the rocks. It is then placed in round masses to dry, after which it is baled and sent to China. It sells at from 5 to 8 cents per pound in San Francisco at wholesale, to be shipped to China.—Dr. E. Palmer, A. J. Ph., November, 1878.

FUNGI.

Ergot—Contribution to a Knowledge of its Alkaloids.—T. Blumberg was unable to prepare ergotinia according to the method of Tanret (see Proceedings, 1878, p. 604), but obtained it by treating the ergot with ether, and 95 per cent. alcohol. The fatty oil obtained by exhaustion with ether, when shaken with water, acidulated with sulphuric acid, and then filtered from the separated fats, was found to yield the alkaloid. A portion of this filtrate being neutralized with carbonate of sodium, was filtered, and the precipitate, when dissolved in acetic acid, yielded a precipitate with potassio-bismuthic iodide. Again, the acid aqueous liquid, after being made alkaline, gave up its alkaloid to ether when shaken with it, and deposited it in the crystalline state on evaporation. The alkaloid thus obtained, when treated with two volumes of concentrated sulphuric acid, became first of a rose color, which changed to a deep violet-blue; with Fröhde's reagent, the acid solution assumed a blue color, which gradually changed to blue-green. Physiologically ergotinia resembles picrosclerotin in its action on the spinal marrow; both are readily decomposed, and they behave similarly towards sulphuric acid and towards Fröhde's reagent. Further, the author believes his experiments prove that the ergot resin examined by Ganser was a decomposition product of ergotinia; that ether withdraws from ergot, besides fatty oil, some portion of the fatty substance, and that the ergotinia was present in Wigger's ergotin.—Ph. J. Trans. (3). 9, 598–600; in J. Ch. Soc. May, 1879, p. 387.

Ergot—Determination in Flour or Bread.—According to Dr. Hofmann, 30 grams of coarsely-grated bread are macerated with 40 grams of ether and 20 drops of diluted sulphuric acid for 24 hours, the mixture strained, the liquid shaken with saturated solution of bicarbonate of sodium. On standing, the latter separates, and, in the presence of ergot, has a violet color. $\frac{1}{10}$ th per cent. of ergot is thus detected; the process depending on the separation of the coloring matter of the ergot—sclererythrin—from its combination with lime, solution in ether, and combination with soda.—Ph. Centralh., November 28th, 1878, p. 455.

Agaricus atramentosus—Presence of a Quinonoid Body.—W. Thörner has obtained a tinctorial substance of the composition $C_{11}H_8O_4$ by extracting *Agaricus atramentosus* with ether. The crystals left on the evaporation of the ether after purification

form dark-brown scales of a metallic lustre, soluble in boiling alcohol or glacial acetic acid, with vinous red, and in alkalies with a greenish-yellow color.—Ber. d. d. Chem. Ges., No. 6, 1878; in Chem. News, July 5th, 1878, p. 9.

FILICES.

Polypodium Phymatodes.—Under the name of “male fern” for the frond bearing fructification, and “female fern” for those without sori, this plant is used in Siberia for nephritis, dysuria, and other kidney complaints. It is used either in decoction or tincture; the dose of the decoction being two tablespoonfuls three times a day, and of the tincture a teaspoonful every three hours. The “female fern” is used for leucorrhœa and prolapsus uteri by the native women.—E. M. Holmes’s “Notes on Siberian Drugs,” in Ph. J. Trans., April 19th, 1879, p. 853.

AROIDEÆ.

Amorphophallus Titanus.—The traveller, Odoardo Beccari, has so named recently a gigantic flower which he found in the forests of Sumatra, and which exceeds in size the flowers of the *Victoria regia*, and of *Rafflesia Arnoldi*, very considerably. The flowers have a diameter of 83 ctm., and a length of 172 ctm. Tubers of this plant, which belongs to the Aroideæ, group Dracunculineæ, have reached Italy. In the East Indies an *amorphophallus* (*A. giganteus*) has long been known. The present plant is probably a new species.—Ph. Centralh., December 26th, 1878, p. 498.

GRAMINACEÆ.

Native Indian Corn, Ah-weaph of the Pah Ute Indians.—This variety of maize has been grown by the Indians since the recollection of the oldest person among them. Well-preserved kernels and cobs are found in the mounds of Utah. This species of corn grows from two and a half to three feet high, and is cultivated by the Indians on the river bottoms, maturing in sixty or seventy days. The ears come out of the stalk five or six inches from the ground. Corn is a staple article of food with these Indians.—Dr. E. Palmer, A. J. Ph., November, 1878.

Grain, Malt, etc.—Determination of Moisture.—Barley and other grains contain water in variable proportions, according to age or

exposure, and may contain as much as twenty per cent. immediately after harvesting. It is, therefore, a matter of some importance that the brewer should have a simple method for determining the water in the grain he purchases, for in the case of barley the fluctuation may be from twelve to twenty per cent. In "Musterbrauhaus" (1878) the following is recommended: The grain (or malt) being ground in an ordinary coffee-mill, two to three grams of the coarse powder is weighed upon a watch-glass and heated in a drying-box, at 100° to 110° C. (212° to 230° F.), until it no longer loses weight. The watch-glass and contents are then removed, a second watch-glass is immediately clamped on so that the powder may not absorb moisture during cooling. The weight of both glasses and the clamp being known, the loss is readily ascertained.—Ph. Centralb., June 11th, 1878, p. 260.

Arundo Phragmitis.—A species of cane growing along water-courses and about springs in Southern Utah. Numerous small insects puncture the leaves of this plant and a liquid exudes which, while in a soft state, is scraped off by the Indians with their long finger-nails and eaten. At first it has a pastolike softness, but hardens like gum arabic, has a sugar-candy density and color, and a rather sweet, gummy, licorice taste. When the exudations are sufficiently hardened the cane is cut and laid in bundles on blankets; the manna-like food is then easily shaken off. This substance, if mixed with water, forms a pleasant, nutritious drink, highly prized by the Indians, who call it *Pah-gump-pea-abbah*.—Dr. E. Palmer, A. J. Ph., November, 1878.

Sporobolus Cryptandrus.—The seeds of this species of grass, the *quaque* of the Pah-Utes, are much used by the Indians as an article of food. After being parched they are ground, mixed with water or milk, and made into mush or biscuit. The flavor is good, and the food very nutritious. The leaves yield a short, fine fibre, adapted to the manufacture of paper. It is abundant about St. George, Southern Utah. Other grasses, such as

Sporobolus Airoides, *Eragrostis Purshii*, *Panicum Crusgalli*, and *Vilfa Asperifolia* are very abundant in Southern Utah, and their seeds are gathered in great quantities for food by the Indians. The food is prepared similarly to the above, and it is healthful, nutritious, and more agreeable in flavor than buckwheat.—Dr. E. Palmer, A. J. Ph., November, 1878.

PALMACEÆ.

Phœnix Dactylifera—*Adulteration of Coffee with Date Stones*.—Coffee-drinkers will read with interest some observations made by the Principal of the "Inland Revenue Laboratory," in his annual report just printed, relative to an ingenious method of adulterating that article, which has lately been discovered. Owing to the ease with which roasted vegetable matter can be prepared so as to look like coffee, substitutes for or adulterations of it are frequent. The substance most recently detected as an adulterant is date-stones, which, after being roasted and ground, form such an imitation of coffee as would, when mixed with the genuine article, readily deceive the consumer. The early detection and suppression of this mode of adulteration were effected by the inland revenue authorities at Somerset House, in consequence of information sent by a supervisor at Liverpool that many tons of date-stones, a refuse from the manufacture of spirits at one of the distilleries there, and which had, up to that time, been considered useless, were being bought by a foreign gentleman to be sent to Manchester, and believed to be intended as an adulterant of coffee. The inquiry made led to the discovery that a manufactory had been started in Manchester for the preparation of "Melilotin Coffee," a compound in about equal proportions of coffee, chicory, and date-stones. The manufactory had barely got into working order and very little of the "melilotin" coffee had been sent into consumption.

Brahea Armata.—This fine palm, found at the bottom of the Big Cañon of the Tantillas, Lower California, grows from fifty to sixty feet high, its long, graceful, pendant branches of fruit making it a beautiful object. The Cocopah Indians consume large quantities of this fruit while fresh, and dry it for winter use; they also eat the base of the young leaves. Another palm, the

Pritchardia Filamentosa, from forty to fifty feet high, though not as beautiful as the *Brahea armata*, produces a fruit which is better for food, being much larger, of a more agreeable taste, and containing more pulp. Cocopah Indians consume this fruit, like the above, both in the fresh and dried state; the base of the young leaves is eaten raw in the spring, and the seeds of both plants are ground fine and eaten, and are not inferior to coconut.—Dr. E. Palmer, A. J. Ph., November, 1878.

Sabal Serrulata.—(S. Levistona? Feay. Saw Palmetto.) Dr. J. B. Read gives a botanical description of this plant, and draws attention to some of its characters and uses. The plant grows abundantly in the soils of the seacoast and sea-islands of South Carolina, Georgia, and Florida, and may, perhaps, extend into Alabama, Louisiana, and Texas, being, however, most vigorous near the sea. The beach, extending from Mosquito Inlet in Florida to Jupiter Inlet, is one vast scrub of these palmettos, over one hundred miles long, and from one to three miles wide, broken only by live oak hammocks along the creeks and inlets. The fibrous roots of the plant, extending for several feet from the stem, and being half exposed above the sand, render travelling in spring-vehicles almost an impossibility.

The saw palmetto is of great use to the inhabitants for a variety of purposes. The leaves form an excellent thatch for houses, and are baled and sold for paper stock. The fibrous roots are easily formed into scrubbing brushes; they contain a large amount of potash salts, and may in time become a source of that alkali. The berries, or more properly drupes, which ripen in October and November, are of about the size of an olive, dark purple in color, contain a large quantity of juice, and a pit shaped like that of the olive. Their taste is at first intensely sweet, then becomes pungent, and finally leaves a sensation of smoothness, as if the parts had been lubricated by oil. They contain, besides a large quantity of saccharine matter, both fixed and volatile oil. The latter is yellow, and produces when heated a pungent vapor capable of producing violent headache. This, as well as the fixed oil, separates from the expressed juice, which, by evaporation, yields a rich golden syrup, slightly retaining the peculiar taste of the fruit, and which neither ferments nor candies. The residue of the seeds, as well as the berries themselves, are greedily eaten by animals, and fattens more speedily than the presscake of rape or flaxseed.

The author is of the opinion that the fruit may prove a valuable remedial agent, particularly in cases where a highly nutritious agent is needed. It is known to induce sleep, to relieve the most troublesome coughs, to promote expectoration, improve digestion, and to increase fat, flesh, and strength. It has been used with benefit in cardiac asthma, phthisis (especially laryngeal phthisis), chronic bronchitis, etc. Mixed in boiling water, and

used by inhalation, it has been found very beneficial in chronic ozæna.—A. J. Ph., April, 1879, p. 169.

Sago—Preparation in Sumatra.—H. von Rosenberg gives the following method by which sago is produced on the small islands along the west coast of Sumatra. The tree contains the maximum quantity of starch when the flowers have appeared at its crown, and its large leaves have been shed, a period which requires, however, many years. The appearance of the tree may then be compared to that of a colossal candelabra. The tree is felled, sawed into pieces about four to five feet in length, each of which is split into four pieces, which are deprived of bark and are placed in the shade to dry for several days. The pith is then grated so as to form a coarse meal. This is placed upon coarse muslin spread over a wooden trough; water is added, and the mass thoroughly kneaded with the addition of more water, the water running into the trough as a milky liquid. This process is continued until the water no longer becomes turbid, when the contents of the trough are allowed to subside; the water is then decanted and the white sediment dried in the air.—Zeitschr. Æst. Ap. Ver., June 1st, 1879, p. 248.

ALISMACEÆ.

Sagittaria Simplex.—The Mojave Indians of the Colorado River, Arizona, as soon as the water subsides in the spring dig for the bulb of this plant, which resembles that of crocus. It is exceedingly farinaceous and palatable, whether raw or cooked with other substances.—Dr. E. Palmer, A. J. Ph., November, 1878.

SMILACEÆ.

Smilax Glauca.—Mr. John Blankenhorn has made a proximate examination of the long cylindrical light-colored rhizome of this plant. He failed to isolate a distinct principle peculiar to the root. A slightly bitter amorphous substance, the aqueous solution of which produced froth on agitation, and an amorphous, bitter, and slightly acrid principle, were separated, but both were evidently quite impure. Tannin, starch, sugar, albumen, resin, and pectic compounds were determined.—A. J. Ph., June, 1879, p. 298.

LILIACEÆ.

Onions and Garlic—Uses in Greece.—Professor X. Landerer states that the onion and garlic are among the most important articles of food of the Greeks and other Oriental nations. These bulbs are prepared in all possible fashions, boiled, baked in hot ashes, made into a salad with oil and vinegar, or they are eaten raw. A large proportion of the working classes make a meal with a piece of bread, an onion, and a bunch of grapes, to which may be added in summertime a tomato. Onions are also used very generally in the form of poultice as applications to painful swellings, etc. Both the garlic and the onion are cultivated with great care in gardens, "scorodones" being the term for garlic-beds, and "cromyones" for onion-beds.—New Rem., April, 1879, p. 99.

Yucca Baccata.—This is one of the most useful plants to the Indians of New Mexico, Arizona, and Southern California. Its fruit is eaten while fresh and in the dry state. It grows from two to eighteen feet in height, and becomes a tall tree further southward, varying in diameter from eight to twenty inches. The bodies of these plants are very fibrous. Indians and Mexicans, when in want of soap, cut the stems into slices, beat them into a pulp, and mix them with water as a substitute for soap, for which it answers finely. The leaves are generally about two feet in length and very fibrous. In order to remove the bast the leaves are first soaked in water, then pounded with a wooden mallet, at the same time occasionally plunged into water to remove the liberated epidermis. Then if not sufficiently clean and white it is returned to the water for a time, and again put through the beating process; generally the second course is sufficient. The fibres of the leaves being strong, long, and durable, are adapted for Indian manufactures; those of Southern California making therefrom excellent horse blankets, while all the tribes living in the country where the plant is found use it to make ropes, nets, hats, hair-brushes, shoes, and mattresses. The plant, so fibrous and so abundant on land utterly worthless for the growth of anything more valuable, can be had for the gathering, and seems to offer a valuable material for paper manufacture. Another species,

Y. brevifolia, while not so useful for Indian purposes, also offers a good raw material for paper. Vast tracts are covered with it,

which assume a forest-like appearance about the Mojave River, Southern California. The plant produces an abundance of large seeds, which contain much nutrition; they are ground fine, and either eaten raw or cooked in the form of mush by Southern California Indians. The leaves of

Y. Whipplei yield a very soft white fibre, capable of being made into a very nice thread. Indians use this fibre to form a padding to their horse blankets; the young flowering stems, while in their tender condition, are either eaten raw or roasted; the seeds are ground into flour and eaten. This plant in bloom is one of the finest garden ornaments, very common over most parts of California. Finally, the leaves of

Y. angustifolia, which is very common in Utah and Arizona, yield the finest fibre of all the *yuccas*, and like all of them is adapted to manufacturing purposes. The young flowering stems are used by the Indians after the manner of asparagus, and, eaten raw or cooked, are not to be despised. The root, pounded up, is used as a substitute for soap.—Dr. E. Palmer, A. J. Ph., December, 1878.

Erythronium dens Canis, L.—*Analysis of the Bulbs*.—The bulbs, which are used by the Siberians as a favorite food in the first spring months, and have the reputation of a powerful aphrodisiac, as a remedy for intestinal worms and colic, and even against epilepsy, have been the subject of analysis by Professor Dragendorff, who received his supply from Dr. Duhmborg, of Barnaul. The bulbs were received deprived of their external teguments; they are longish, running to a point below, rounded above, and generally somewhat bent nearly perfectly circular on a transverse section, about 4 cm. long, and 0.5 cm. in diameter at the middle. They are tolerably hard, pure white, mealy, and remind somewhat of a tooth provided with the root. Its histological relations are quite simple: a very thin-walled parenchym, the cells of which are rich in large, handsomely striated layers of starch-granules, constitutes the main portion of the tissue, in which may be observed dispersed (upon the transverse section) roundish bundles with some central vessels and several rows of thickened prosenchym cells. The careful analysis of the author, the details of which are given, proves that the chemical composition of the bulbs is equally simple. Components, to which their reputed medicinal value could be

referred, were not found, unless it be the small quantity of resin found. Neither alkaloid nor glucoside, though searched for, could be determined, and although the frothy character of the aqueous extractions appeared to indicate a saponin-like body, none was found. The result of the analysis is given as follows: Moisture, 9.405; ash, 1.169; cellulose, 2.575; vasculose, cuticulose, etc., 0.859; amylon, 51.247; glucose, 14.317; dextrin-like body, 3.390; metaralic acid, 0.954; vegetable acids (citric and tartaric), 0.520; oxalic acid, trace; albumen, 0.011; albuminoid matter, insoluble in water, 5.162; fat, 0.135; resin, 1.045. The tubers, when freshened up by moist soil, lost 36 per cent. of their weight on drying.—Arch. Pharm., July, 1879, pp. 7-13.

Aloes—Chemistry.—Mr. F. W. Branson has read an interesting paper on the chemistry of aloes at the meeting of the "Chemists' Assistants' Association," which is reproduced in "Ph. J. Trans." (March 1st, 1879, pp. 716-718). The various aloes are considered to form three groups: 1. Barbadoes and Curaçoa; 2. Socotrine and Hepatic; 3. Natal and Cape. The paper appears to be mainly a compilation of all the facts that have accumulated, much of which has been noted in previous reports, and is therefore not extracted for this. The author has, however, made some original researches, chiefly of a confirmatory nature, and the paper will therefore be found quite interesting to those engaged in the study of the aloes or their products.

BROMELIACEÆ.

Agave Utahense.—The Pah-Utes strip the leaves from the heart of the plants of this as well as other species of *agave*, and cook them on heated stones. The food is very nourishing and palatable. The leaves of

A. deserti, which are very long and fibrous, are cleaned like those of *Yucca baccata* (which see), and made into strong and durable ropes, mats, nets, etc. Being very abundant, and containing so much valuable fibre, surpassing in length and strength many other fibres in use for cordage and for paper, the plant may some day be profitably cultivated on the desert wastes of the United States.

Its uses for the purposes named, as well as of the heart for the purposes of food and for preparing a strong distilled liquid called

mescal by Mexicans, constitutes this species of *agave* one of the most important natural productions to the Arizona, New Mexican, and Lower California Indians.

A. Shawii is one of the finest garden plants, but the fibre is only suitable for paper, being short. The Indians are very fond of a sweet honeylike nectar found in the base of the flowers. It is only found in the neighborhood of San Diego, California.—Dr. E. Palmer, A. J. Ph., December, 1878.

IRIDEÆ.

Saffron—Cultivation in Greece.—Professor X. Landerer observes that Greece and the Hellenic Islands would be able to supply considerable quantities of saffron if the necessary care were bestowed upon its protection and cultivation. Considerable quantities are furnished by the islands of Naxos and Thermia. The women there gather the saffron, sew it into small bags, and sell it to the merchants of Syra (Hermupolis). The most is collected upon the small Turkish island, Simmi, and upon Chios, whence it is carried to Smyrna. It used to be much cultivated upon Mount Athos, but has gradually fallen into such neglect that it may be said to be almost exterminated. All the saffron at present collected in Greece and in Macedonia probably amounts to only 50 or 60 kilos. Adulterations, such as they are fancifully described in pharmacological works, are never met with. The following species of *Crocus* occur in Greece and Thessaly: *Crocus sativus*, *C. vernus*, and *C. minimus*.—New Rem., October, 1878, p. 297.

Saffron—Detection of Adulterants.—The following simple means of detecting adulterations of saffron is given in "Chemical News" (January 24th, 1879, p. 35): To detect adulteration with *Calendula flowers* (Feminelle), it is merely necessary to moisten a few flowers (?), and to rub them singly with the finger on white paper. The genuine flowers (?) will give a fine rich yellow color, whilst the feminine will only yield a violet-reddish hue. It can also be easily detected by soaking the suspicious flowers in pure, or, better still, distilled water. The real saffron will retain its fine red color after hours, whilst the feminine will lose its artificial tint within a short time. To detect an admixture of *Honey* and *Barytes* it is merely required to put a pinch of saffron in a

tumbler with pure distilled water, and agitating it for a few minutes. Adulterated saffron will at once turn the water cloudy, and even small particles of dust may be seen falling to the bottom, which, on pouring the water carefully out, will be found to be a slimy, sandlike mass. With pure saffron the water will remain clear, showing a fine, pure yellow color, which, according to the quality of the flowers, will be more or less intense. Five or ten minutes suffice for these experiments.

MUSACEÆ.

Banana—New Uses.—The banana has recently found a new use in Venezuela. It has the property of keeping the soil moist around it, in a country where sometimes no rain falls for months, so it has been employed to give freshness as well as shade to the coffee-plant, whose cultivation has been greatly extended (38 million kilograms of coffee were produced in Venezuela in 1876). The Venezuelans can consume but little of the banana fruit thus furnished, hence attention has been given to increasing its value as an export. At the Paris Exhibition were samples of

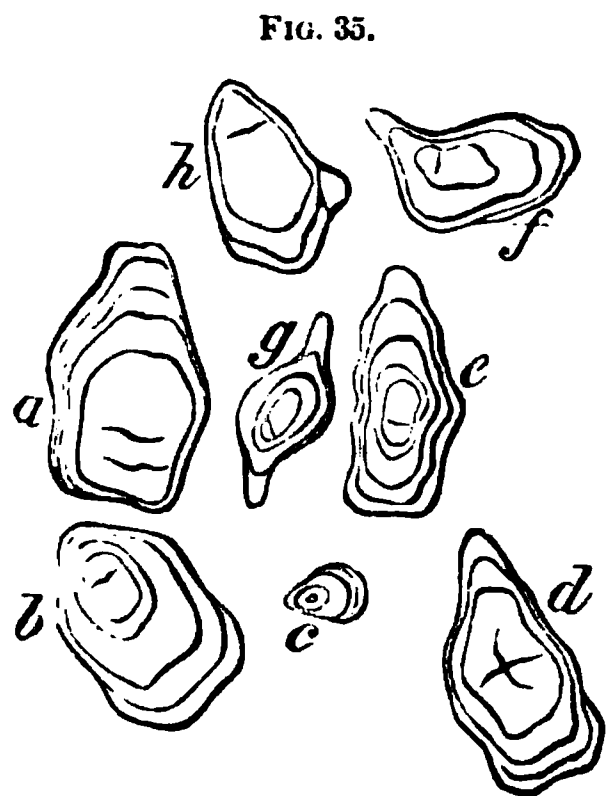
Banana Flour, obtained by drying and pulverizing the fruit before maturity; and *brandy*, from the ripe fruit. The flour, analyzed by Messrs. Marcano & Muntz, gave 66.1 per cent. of starch, and only 2.9 per cent. of azotized matter.—New Rem., May, 1879, p. 144; from Confec. Jour.

According to Mr. Corenwinder, the total sugar in the banana when ripe and sound exceeds 20 per cent., three-fourths of which is crystallizable. When over-ripe the sugar is reduced to from 16 to 14 per cent., whilst the non-crystallizable sugar rises to 11 or 12 per cent., thus not being merely relatively, but positively increased.—New Rem., May, 1879, p. 146; from Compt. Rend.

MARANTACEÆ.

Natal Arrowroot.—A recent examination of Natal arrowroot, part of the collection of Port Natal products sent to England in 1871, seems to indicate that various starches enter commerce under that name. The present sample, examined by R. Hansel, is quite distinct from that described by Wiesner in his "Rohstoffe

des Pflanzenreichs" (p. 284). It consists of a tolerably fine, pure



Natal Arrowroot.

white powder, in which the granules can be partly discerned by the naked eye. Under the microscope it proves to be composed of granules of variable size, simple (rarely twin-formed) (Fig. 35), somewhat flattened, variously shaped, showing rings with greater or less distinctness. The shape of the larger granules is generally oval (*b*), indented, or very peculiarly shaped (*d*, *e*, *f*, *g*, and *h*); the smaller granules are egg-shaped (*c*). The nucleus fissures are generally transverse, single, double, or in the form of a cross (*d*). Their

diameter varies between 0.01 and 0.058 mm., the greater proportion being between 0.021 and 0.044. The nucleus appears bright under water, dark under glycerin. By polarized light the cross becomes quite distinct.—Zeitschr. Est. Ap. Ver., January 1st, 1879, p. 9.

SANTALACEÆ.

Nyssa Aquatica, L. (*N. biflora*, Mich.).—Dr. Hager draws attention to the wood of this tree, which abounds in swamps and along the water-courses of the Carolinas, where it is known under the name of "tupelo tree." The wood is light, yellowish-white and has the property of absorbing much water when immersed in it, swelling to several times its volume. Hence it has been proposed and is used for the purpose of making tents, for which it appears to be admirably suited. The quantity of water absorbed by it amounts to five times the weight of the dry wood, which thereby swells to about four times its original volume. The tents can, however, be used but once, since they cannot be reduced to their original volume by drying.—Ph. Centralh., February 6th, 1879, p. 49.

ELÆAGNACEÆ.

Shepherdia argentea, called "Buffalo berry," grows by water-courses in mountainous districts of Central Utah. The habits of the tree are similar to those of the elderberry. It grows from

ten to fifteen feet high, bears abundantly a red fruit, small, roundish, sour, but pleasant to the taste, and used by the Indians.—Dr. E. Palmer., A. J. Ph., November, 1878.

LAURINEÆ.

Cinnamomum Loureiri (?).—Dr. G. Martin, of the Pharmaceutical Laboratory of Tokio, Japan, has examined a Japanese cinnamon-bark, derived from the Island of Sikok, and which he believes should be referred as above. Ten pounds were subjected to distillation with steam under pressure, and yielded 40 grams of a peculiar volatile oil, which adhered tenaciously to the sides of the receiver, and which differs in its character both from the volatile oil of Ceylon cinnamon and from the ordinary cassia oil. It has a wine-yellow color, is lighter than water, has an odor reminding of cinnamon oil and camphor, but is more delicate and fragrant. Conc. sulphuric acid produces with this oil a magnificent color reaction; first violet-red, then through indigo-blue to a magnificent green, which is retained for some time, but finally changes to brown. Conc. nitric acid does not form crystals of nitrobenzoic acid, but, instead, an amorphous waxy mass, which again liquefies upon the slightest increase of temperature. It is dextrogyrate, rotating 4° according to Wild's polaristrobometer. When treated with solid sodium hydrate it loses its cinnamon odor, and a pure odor of camphor is developed in its place. By treatment with solution of permanganate a distinct bitter almond odor is developed.—Arch. f. Ph., October, 1878, p. 337.

POLYGONACEÆ.

Polygonum Punctatum—*Medicinal Value*.—Dr. B. Woodward has used this plant,—which contains, when dried, 18 per cent. of tannin,—in the form of saturated tincture as a remedy in dysentery, watery or mucous diarrhoea, and as an antipyretic in typho-malarial and bilious remittent fever. It has proven of value in such diseases, and particularly in the latter cases has few equals. The author finds some of the fluid extracts of the drug to be valueless, probably from want of care in gathering the true plant. A variety of the species, known as hearts-ease, has leaves larger than the true ones, and also marked with a dark blotch, which the true polygonum has not. The flower of the true variety is pink, while that of the false is white. The plant should be gathered while in blossom and dried quickly

in shade. It must be kept in tight paper bags to retain its virtue. The dose of the saturated tincture is 20 minims to 1 drachm in mucilaginous drinks. It may also be given by enema in the latter dose.—New Rem., August, 1878, p. 238; from Am. Mod. Bi-weekly.

Rumex Hymenosepalus.—This species of dock is very abundant in sandy localities, and along river bottoms in Arizona and Southern Utah. Indians use the root for tanning buckskins. Moccasins made from leather thus tanned are rendered much more durable, and less liable to injury from moisture. It is also used in dyeing, as it yields a bright-brown or mahogany color. Occasionally, Indians ornament their bodies by using this substance to form designs on their limbs. The people of Utah use the leave stem, as a substitute for rhubarb, to make pies.—Dr. E. Palmer, A. J. Ph., December, 1878.

New Rhubarb.—M. Colin, of Verdun, has received a plant which M. Chauveau considers to be the source of Chinese rhubarb. The plant, having produced flowers, was submitted to Professor Baillon for examination, who recognized it as a variety of *Rheum hybridum*, which he names

Rheum Colinianum.—He found a section of the root to have the characters of a pretty good rhubarb. This appears to sustain the opinion expressed by Baillon in 1876, that the Chinese rhubarb is probably obtained from several species.—A. J. Ph., August, 1878, p. 385; from J. de Ph. et de Chim., June, 1878.

Rhubarb—Action of Iodine.—The action which a solution of iodine exercises upon rhubarb in the form of either an unstrained solution or a cold, aqueous, filtered infusion has already been the subject of an investigation undertaken by Mr. Husson (see Proceedings, 1875, p. 146), with a view to showing what practical use could be made of this action in the determination of the relative qualities of samples of rhubarb. The conclusion which he draws is the following: "The greater the quantity of iodine absorbed without a change of color taking place in the decoction, the more certain we can be of having before us a rhubarb of first quality. On the other hand, the less iodine required to produce a greenish tint, and leave a black residue, the worse will be the quality of the rhubarb."

The statement of Mr. Husson appearing to require confirmation, Mr. Henry G. Greenish has undertaken a series of experi-

ments with a view of ascertaining whether the quantity of iodine absorbed by a sample of rhubarb is capable of indicating the relative quality of the specimens, and of determining, if possible, to which of the constituents of the rhubarb the absorbent power is mainly due. Mr. Husson's method is as follows: A decoction is made of five grams of the sample in 150 cc. of water, and to the unfiltered product the solution of iodine (containing twenty-five grams in the liter) is added, until a drop of the mixture produces on a drop of starch-paste a blue coloration; or this process may be replaced by one of cold maceration, the filtered product being then employed for titrations. The changes of color observed by Mr. Husson being evidently due to the presence of starch (there is no change of color observed in the decoction of rhubarb—for instance, *R. Mandshuricum*, which contains no starch, even when iodine is added in decided excess), Mr. Greenish for his experiments preferred to operate with the cold filtered infusion, prepared as follows: 5 grams of the root were macerated twenty-four hours at the ordinary room-temperature, being frequently shaken during the day and allowed to stand during the night, and the fluid then filtered. Portions of the filtrates were then subjected to the following experiments:

1. 25 cc. were titrated to greenish reaction, the end of the reaction being determined in this, as in all other cases, by bringing a drop of the liquid in contact with starch-paste, and the number of cc. noted; the titration was then continued to blue coloration.

2. The mucilage and cathartic acid were precipitated from a second portion of 25 cc. by appropriate means, and the filtrate titrated to the blue coloration upon starch.

3. The precipitated mucilage and cathartic acid were dissolved in water and titrated.

4. The tannin, mucilage, and cathartic acid were removed from a third portion of 25 cc., and the filtrate titrated to blue reaction.

5. The residue of the root insoluble in cold water was washed with water, boiled in a porcelain dish with 100 grams of water to one half, cooled, made to measure 100 cc., and 25 cc. of the filtrate titrated to blue reaction.

The accompanying table shows:

- (a.) cc. iodine required in experiment (1) to green coloration.
- (b.) cc. iodine required in experiment (1) to blue coloration.
- (c.) cc. iodine required in experiment (2).

(d.) cc. iodine required in experiment (3).

(e.) Percentage of cathartic acid present in the sample, as determined by absolute experiment.

(f.) cc. iodine required in experiment (4).

(g.) cc. iodine due to absorption of tannin—calculated.

(h.) Percentage of tannin and chrysophan present in sample as determined by absolute experiment.

(i.) cc. iodine required in experiment (5).

(k.) Sum of cc. required in the titration of the aqueous infusion and decoction of residue obtained by adding the figures in columns *b* and *i*.*

	a.	b.	c.	d.	e.	f.	g.	h.	i.	k.
R. <i>Muscoviticum</i>	3.20	2.20	1.45	0.55	5.25	1.40	0.05	17.13	0.35	2.25
" <i>Chinense</i>	2.10	1.30	0.95	0.60	4.88	0.60	0.35	14.17	0.30	1.60
" <i>Palmatum</i> . (Przewalski.).....	2.30	1.60	1.30	0.15	2.03	1.10	0.20	8.22	0.20	1.80
" <i>Anglicum</i>	1.80	1.30	0.85	0.30	2.50	0.60	0.25	4.83	0.35	1.65
" <i>Sibiricum</i> , I.....	1.20	1.00	0.55	0.55	2.26	0.50	0.05	7.84	0.50	1.50
" <i>Mandshuricum</i>	2.00	1.40	1.30	0.30	0.70	1.00	0.30	9.75	0.20	1.60
" <i>Sibiricum</i> , II.....	1.90	1.30	0.90	0.20	1.70	0.80	0.10	5.03	0.40	1.70
" <i>Palmatum</i> . (St. Petersburg Bot. Gard.)	1.60	1.00	0.25	0.65	?	0.40		7.95	0.40	1.40

The conclusions drawn from his experiments are, (1) that the quantity of iodine a sample of rhubarb is capable of absorbing cannot be regarded as indicating its quality, and (2) that this quantity absorbed does not depend for its absorption on the active ingredients alone.—Ph. J. Trans., April 5th, 1879.

Rhubarb—Analyses.—Mr. Henry G. Greenish has made analyses of the four following samples of rhubarb, for the purposes of comparison of their various constituents, active or otherwise, adopting a method similar to, though not identical with, that adopted by Professor Dragendorff in a previous examination of rhubarb (see Proceedings, 1878, p. 200).

1. *Rheum Chinense*—*Commercial Rhubarb*.—Forwarded to the Dorpat Institute from the Pharmaceutische Handelsgesellschaft in St. Petersburg as a fine sample.

* The author, in his description of the first experiment, the results of which are represented by columns *a* and *b*, says: "Owing to the thick yellow state of the liquid at this point a blue tint is not easily seen. Two points were, therefore, noted: that at which the starch-paste assumed a green tint and that at which the reaction was strongly blue" It is not very clear, therefore, how the results under *b* can be less than under *a*.—REP.

2. *Rheum Sibiricum*.—Young roots collected by Dr. Duhmberg, of Barnoul, in the Sajan Mountains.

3. *Rheum Mandshuricum*.—Sent as sample to the Pharmaceutische Handelsgesellschaft in St. Petersburg. Large, somewhat spongy masses, apparently from very old plants. Partly unsound in the centre. The sample analyzed was taken from a sound piece.

4. *Rheum Palmatum*.—The fresh root, of four to five years' growth, was sent from the St. Petersburg Botanical Garden to the Dorpat Pharmaceutical Institute for examination. The details of the author's analyses, which are copious, need not be given. The results are given in the following table:

	No. 1.	No. 2.	No. 3.	No. 4.
	Rheum Chinense.	Rheum Sibiricum.	Rheum Mandshuri- cum.	Rheum. Palmatum.
	Per cent.	Per cent.	Per cent.	Per cent.
Moisture.....	10.04	10.24	6.63	9.02
Ash (free from CO ₂).....	8.06	2.84	15.23	4.54
Mucilage (soluble in water).....	1.72	2.75	0.85	2.40
Arabic acid (?).....	3.59	4.10	2.45	3.69
Metarabic acid.....	2.38	3.34	1.12	5.84
Pararabin (?).....	3.48	0.26	6.17	1.79
Starch (saccharifiable by diastase)..	3.69	6.92	0.26	11.98
Cellulose	4.20	8.25	3.05	3.25
Sugar.....	2.34	8.28	3.60	2.78
Substance soluble in water and al- cohol.....	13.61	5.61	5.66	4.68
Cathartic acid.....	4.96	1.70	0.70	?
Mucilaginous matter precipitated in the place of cathartic acid.....				4.75
Malic acid (etc.)	2.28	2.28	0.48	0.65
Oxalic acid.....	7.87	0.34	27.30	0.84
Free chrysophanic acid, soluble in petroleum ether.....	more than traces.	1.45	absent.	trace
Chrysophan and tannin.....	9.58	5.03	9.75	7.95
Resinous substances, soluble in ether	0.75	0.90	1.25	0.25
Resinous substances, soluble in al- cohol. (Emodin, erythroretin, phæoretin).....	2.74	10.15	2.38	2.70
F.....	0.50		trace.	0.37
Proteinaceous substances.....	6.65	6.90	3.74	11.50
Total.....	88.44	81.34	90.62	79.00
Paracellulose, vasculose, pectose, lignin, etc., and loss.....	11.56	18.66	9.38	21.00
	100.00	100.00	100.00	100.00

A comparison of these results with the analyses of Professor Dragendorff (referred to above) shows:

I. In *Rheum Chinense*, in regard to active principles (cathartic acid, chrysophan, tannin, etc.), a very satisfactory result.

II. In *Rheum Sibiricum* agreement in the peculiarity of this root previously pointed out by Professor Dragendorff, viz., the large amount of free chrysophanic acid.

III. In regard to *Rheum Mandshuricum*, that this is an inferior rhubarb, the introduction of which into Europe can only be sanctioned as a speculation on its richness in chrysophan and tannin, etc.

IV. It would tend to show, in regard to *Rheum palmatum*, either that this plant forms the most important constituent only in a more advanced state of growth, or that in the St. Petersburg climate it is incapable of so doing. The sample examined characterizes itself as a young root by the large amount of proteinaceous, amylaceous, and mucilaginous substances it contains.—Ph. J. Trans., May 17th, 1879, pp. 933–936.

CHENOPODIACEÆ.

Herba Santa Maria.—According to F. Rey, the plant which goes by this name in Brazil is the

Chenopodium Abrosioides, L., or *C. Suffruticosum*, W. — It is a native of Mexico, but is now naturalized in Brazil, in the southern provinces of which it is known under the above name, while in the northern it is known under the names of “matruz,” “mentruz,” and “mastruco.” These latter names, however, are also used for *Chenopodium anthelminticum* and for several plants of the natural order *Cruciferae*, viz., *Lepidium sativum*, L. *Bonariense*, L. *Senebiera pinnatifida*, D. C., and *Senebiera incisa*, Willd. In Lisbon and in the Azores it is known under the name of “herva tormiguera.” It is often confounded with *C. anthelminticum*, from which, however, it differs in having a leafy inflorescence and in its less powerful but more agreeable odor. The plant has an almost woody stem, about the size of a goosequill, and from one to two meters in height. The leaves are alternate, lanceolate, sometimes slightly sinuate, or even strongly dentate; the flowers are very small, and of a greenish color; the inflorescence consists of simple leafy spikes. The fruit is small, and entirely covered by the calyx. The seeds are very small, polished, and of a black color. The root is yellowish externally and white inside. The whole plant has a powerful aromatic odor. In Brazil the tops of the plant are used as a vermifuge, in dose of 6 to 8 grams, given as infusion, or made into

an electuary with castor oil, and are said to be remarkably efficacious. In Europe, it has been used by Plenck with good results in nervous affections, chiefly in chorea, and Dr. Mik (of the Grand Hospital), of Vienna, obtained equally good results from its use in similar complaints. Plenck gives it in form of infusion, 8 grams to 230 grams of boiling water, with some bruised peppermint; a tablespoonful being given morning and evening.

Another species of *Chenopodium*, *C. Botrys*, *L.*, which with *C. anthelminticum* shares the name of "Jerusalem Oak" in the United States, is said to have been used in France with advantage in catarrh and humoral asthma.—Ph. J. Trans., March 1st, 1879, p. 713.

Atriplex Californica.—This plant grows in ravines, and has large, long roots, which are much used by the Indians and Mexicans of California as a substitute for soap. After being pounded and mixed with water, it is said to be especially good in cleaning woollen fabrics. The seeds of it, either parched or raw, are reduced to flour and made into mush or bread. The seeds of a number of other species of *Atriplex*,

A. Powellii, *A. lentiformis*, *A. expansa*, *A. confertifolia*, *A. Nuttallii*, and *A. canescens*, are also yielded abundantly, and are gathered by the Indians of Utah, Arizona, and California for the same purposes as those of *A. Californica*.—Dr. E. Palmer, A. J. Ph., November, 1878.

AMARANTACEÆ.

Amarantus leucocarpus and *A. Powellii*.—The seeds of both plants, the *Camoot* of the Pah-Utes, are highly prized as food products by these Indians, by whom they are regularly cultivated. They are also found abundant in the wild state on river bottoms, and are very prolific in seeds, which are very nutritious and of an agreeable taste. The bread or mush made of the meal is very good and not to be despised.—Dr. E. Palmer, A. J. Ph., November, 1878.

PLUMBAGINACEÆ.

Baycuru.—Mr. Charles Symes has examined the root of a plant growing on the shores of the Rio Grande, the vernacular name of which is baycuru or biacuru. It imbeds itself more or less in the sand, a number of radical leaves rising above, and being some five to seven inches in length by one and a half or

two inches in breadth. The flowers resemble those of *Saxifraga serratifolia*. At present the plant cannot be identified, but from the character of the root and the description of the plant Mr. Holmes considers it likely to be a *Statice*, probably *Statice Brasilensis*. The root is the part used medicinally, both fresh and dry. In the latter state the pieces are six or seven inches in length, from one-third to one inch in thickness, and tortuous in shape. The cortical portion is thin, of a dark-chocolate color, contrasting markedly with the central portion, which is of a flesh color in some pieces, in others darker; the former has an acrid astringent, the latter a purely astringent taste, which suggests the probability that the acrid resin, found by the author, exists in the cortical portion only. The natives have an unlimited amount of faith in its virtues as an astringent and discutient remedy in all kinds of enlargements and glandular swellings, externally as a fomentation, and frequently as a vapor. It is also prescribed by the medical men, not as a specific, for Dr. Landell informs Mr. Symes that he has sometimes found it to fail utterly, but as a rule it is reliable both externally and internally, and forms a valuable astringent gargle. The small sample of drug received was subjected to an examination for its constituents, which proved that the activity of the root, partly, if not chiefly, depends on tannin, of which it contains about 12.5 per cent., and its greenish colored reaction with iron salts indicates that it belongs to that variety known as mimotannic acid. It also contains 1.3 per cent. of acrid pungent resin, soluble in ether and alcohol; a small quantity of volatile oil; a resinous substance, insoluble in ether, soluble in alcohol; proteic and pectinaceous bodies, starch, coloring-matter, chloride and sulphate of sodium, potassium, a soluble silicate, and 1.4 per cent. of moisture. The ash, 4.5 per cent., consists chiefly of soda and silica.

Pharmaceutically, the infusion (℥ss. to the pint) and tincture with proof spirit (1 to 10) appear to be the best preparations, the dose of the former being one ounce, of the latter one to two drachms. An aqueous extract, of which it yields one-third its weight, contains all the astringent properties, but an alcoholic extract contains also the acrid resin upon which its discutient properties probably depend.

Some details of the process by which the above results were obtained, which is that of Dr. G. C. Wittstein as modified by Fleury (*J. de Ph. et de Chim.*, 1872), are given in the author's

paper, which was favorably commented on in the discussion following its reading.—Yearbook of Pharm., 1878, p. 530.

Referring to Mr. Holmes's identification of baycuru as being the root of the *Statice Brasiliensis*, Mr. W. B. Cranwell gives further support to that view, and states that while the Portuguese-speaking people of Rio Grande call it "Baycuru," those in the neighboring state, where Spanish is spoken, call it "Guaycuru." It is sold by all chemists in Uruguay.—Ph. Jou. Trans., September 28th, 1878, p. 260.

Since giving his opinion as to the botanical origin of baycuru, Mr. Holmes has had opportunity to examine a specimen of what purports to be the genuine root of *Statice Brasiliensis* from the collection of drugs in the department of the Argentine Republic in the Paris Exhibition. As this root differs in character from that examined by Dr. Symes, it is evident that baycuru must be a distinct drug from guaycuru, or that several different roots are sold under the name of guaycura in one district and of baycuru in another. That this latter is the case appears probable from the fact that both baycuru and guaycuru are astringent roots, and from inquiries made by Mr. Holmes. From these inquiries it appears that, on the authority of Señor Domingo Parodi, the guaycuru of the southern provinces of Brazil, in the Island of Catalina, on the shores of the estuary of the La Plata River, and on the seacoast of the provinces of Buenos Ayres, is the root of *Statice Brasiliensis*; that in the southern province the root of another species, *S. antarctica*, is used under the same name, and that, on the authority of Molina, the guaycuru of Chili is the root of *Plegorrhiza astringens*. M. Rey, of Paris, informs Mr. Holmes that under the very similar name of "guayéru," the root, bark, and leaves of a socaceous shrub, *Chrysobalans Icaco*, which grows spontaneously on the shores of Brazil, is used as an astringent in chronic diarrhœa, leucorrhœa, etc. It is thus evident that the name alone is not sufficient to indicate the root used unless it be obtained from the country or district where it is used, for which reason Mr. Holmes points out the character whereby Dr. Symes's baycuru may be distinguished from guaycuru root as follows:

Baycuru is a somewhat contorted root about the size of the finger, with a blackish-brown rough bark externally, the roughness being due to a large number of minute fissures in various directions, cutting the bark up into minute granulations. The transverse section shows a blackish bark, less than a line in thick-

ness, and a bright pinkish-brown spongy medullium, about half an inch in diameter. Under the lens the bark is seen to be distinctly stratified, and the medullium has a ring of radiating fissures midway between its centre and the bark. The taste is astringent..

Guaycuru from the Argentine Republic, which appears to correspond to Señor Parodi's description of the root of *Statice Brasiliensis*, has much general resemblance externally with dandelion root, being branched at the top like that root. It is marked with scattered short fissures, and under a lens the whole surface is seen to be finely wrinkled in a longitudinal direction only, so that it is not cut up into rough points as in the baycuru. A transverse section of the root is of a dark reddish-brown color. The cortical portion is not stratified, but is much darker near the medullium, while the medullium is paler towards its circumference, so that the appearance of a dark line separating the medullium and cortical portion is very prominent. Under a lens a circle of fine radiating dark lines is seen proceeding from the medullium half way through the bark. Minute crystals, probably sea-salt, are scattered throughout the tissue. The taste is astringent and slightly salt and fishy.

Mr. Holmes concludes that while guaycuru may be accepted to be derived from *Statice Brasiliensis*, it is obvious the baycuru is not derived from the same plant, and its source remains to be identified.—Ph. J. Trans., December 7th, 1878, p. 466.

OROBANCHEÆ.

Palo de Velas—*New Species of Parmentiera*.—This remarkable tree, which grows only in the valley of the Chagres, where it is known as the

Candle tree, on account of its peculiar fruit, is described in Hooker's "Journal of Botany." On entering the forests a person might almost fancy himself in a chandler's shop. From all the stems and lower branches hang long cylindrical fruits, of a yellow wax color, so much resembling a candle as to have given rise to the popular appellation. The fruit is generally from two to three and not unfrequently four feet long, and an inch in diameter. The tree itself is about twenty-four feet high, with opposite trifoliated leaves and large white blossoms, which appear throughout the year, but are in great abundance during the rainy season.

Hitherto only one species of *Parmentiera*, *P. edulis*, had been known to exist. The fruit of the latter, called *Quanhscilote*, is eaten by the Mexicans, while that of the candle tree serves for food to numerous herds of cattle, which soon fatten when subsisting on this fruit, guinea grass, and *Batatilla* (*Ipomœa brachypoda*, Benth.). The meat, however, partakes in some degree of the peculiar, apple-like smell of the fruit; but this is by no means disagreeable, and easily prevented by changing the food a few days previous to the killing of the animal. The tree produces its principal harvest during the dry season, when all the herbaceous vegetation is burned up; and on this account its cultivation in tropical countries is especially to be recommended.—*Drug. Circ.*, September, 1878, p. 161.

SCROPHULARINEÆ.

Tong-Pang-Chong.—Under this name a new remedy has, for some time, been brought to England, which is used in skin diseases, and is said to be exported from Siam. It consists of broken root fragments. According to Hance this drug is derived from

Rhinacanthus communis, Nees, and it is used, not only by the native doctors, but also by European physicians in China as an effective remedy in herpes, etc. Dr. Hasskarl states that the young shoots and leaves are crushed and finely comminuted, and then applied to the skin. According to Filet, either the root is extracted with vinegar and the resulting liquid used, or the leaves are pounded to a pulp and then applied.—*New Rem.*, February, 1879, p. 49; from *Pharm. Zeit.*

SOLANACEÆ.

Tobacco—Cultivation in Virginia.—David Patrick Miller contributes an interesting paper on tobacco cultivation in Virginia. After describing the character of soil and localities most suitable for its cultivation, the method of planting, the care necessary to insure a good crop and quality, the process of drying and curing the tobacco is described: The plants, being cut close to the ground, are allowed to lie on the ground long enough to wilt, but not to be burnt by the sun. The main stock of the plant is then split half way up, the plants placed astraddle of "tobacco sticks," which are five or six feet long, and upon which they are placed in the "tobacco house," upon poles, arranged like rafters, and a

suitable distance apart. When the tobacco house, which is roughly constructed of logs, with sufficient space between them to admit of circulation of air, is full, a fire is kindled in the middle of the floor, and kept up for four or five weeks, or until the tobacco is dry; the door being kept closed, and circulation of air secured by ventilation in the roof of the house. When dry, a damp day is selected for stripping; the leaves are all stripped from the stock, assorted into heaps according to quality, and tied into so-called "hands," which consist of about six ounces of leaves held together at the end by a leaf twisted for the purpose. In this condition it is packed in regular layers, and by the aid of powerful pressure; but the leaves, as yet, do not have the aroma for which the tobacco is valued, such being acquired by a sweating process. This final process is called "balking." It is sometimes conducted by the planters, but generally by the merchants who purchase it, and it consists in enveloping the tobacco, placed in compact circular heaps, in blankets or other woollen cloths, and allowing it to remain in that condition until the process of sweating is thought to be completed.—A. J. Ph., September, 1879, p. 426.

In the same journal (p. 425) some statistics on tobacco cultivation are given, from which it appears that Kentucky, according to the census of 1875, leads all other States in the quantity of tobacco produced. The largest average yield per acre, however, is obtained in Pennsylvania, in which State there has since 1875 also been a marked increase in the total quantity produced.

Nicotiana trigonophylla, *N. Bigelowii*, *N. attenuata*.—The leaves of all these species of *nicotiana* are used as tobacco by the Indians of Arizona, Utah, New Mexico, and Southern California. The strength is said to be greater than that of the cultivated variety, though the leaves are smaller.—Dr. E. Palmer, A. J. Ph., December, 1878.

Datura Meteloides—*Jamestown Weed*.—A decoction of this plant is given to young females by the California Indians to stimulate them in dancing. After the root is bruised and boiled in water, the liquid, when cold, is taken internally to produce a stupefying effect, and is much used by the Indians. The Pah-Utes call this plant *Main-oph-weep*. They bruise the seeds, soak them in water, and expose the mixture to the sun's rays to cause fermentation, when it is drunk for its narcotic effect.—Dr. E. Palmer, A. J. Ph., December, 1878.

Stramonium.—An interesting account of the ordeal poison used in the Voodoo rites in Hayti, and of the ceremonies, etc., attending this rite, is given in a letter of Mr. Langston, United States Minister to Hayti, to Secretary Evarts, which is published in "Druggists' Circular" (November, 1878, p. 185). From this it appears that the

Wanga Plant, under which name the poisonous plant used is known, is in all probability a species of *Datura*, and very likely *Datura stramonium*. The letter will be read with interest, but is not suited for extraction.

Lycium pallidum, with scarlet fruit; *L. Berlandieri* (Arizona), with red fruit; *L. Andersoni*, with bright-red or amber fruit (Central Arizona and Southeastern California). The berries of these *Lyciums* are eaten by Indians of Arizona and California, and whites also relish them. They are quite agreeable to the palate, being of a sweet, mucilaginous substance, and adapted to warm climates. The clear bright-colored berry has a very tempting look, and when dried resembles in taste dried currants.—Dr. E. Palmer, A. J. Ph., November, 1878.

Scopolia Japonica.—The root of this plant, which occupies an intermediate position between *Solanum* and *Atropa*, is used by Japanese physicians, according to Dr. G. Martin, of the Pharmaceutical Laboratory of Tokio, for similar purposes that *Atropa Belladonna* is used in Europe. It does not possess the energetic action of belladonna, and contains no atropia, but instead solania, which Dr. Martin has isolated in a crystalline condition. The plant possesses fluorescent properties to a degree which is perhaps not attained by any other plant.—Arch. f. Ph., October, 1878, p. 336.

Duboisia myoporoides, R. Br.—*Botanical Characters*.—The close analogy of the medicinal characters of the "Duboisia" to those of *Belladonna* have attracted prominent attention to this plant, the botanical characters of which are given by Professor De Lanessan as follows: This is a handsome, erect shrub, about 4 or 5 meters high, which is indigenous to New Caledonia and some parts of Australia. The stem and larger branches are covered with a thick and fissured corky layer; the branches terminate in conical, one-sided racemose cymes of small white

flowers. The leaves are alternate, somewhat decurrent, simple, elliptic-lanceolate, exstipulate, entire, narrowed at the base into a short petiole about 2 centimeters long, and there furnished with two small, lateral, narrow leaflets. The entire length of the leaf is 10 to 13 centimeters, its width near the middle $1\frac{1}{2}$ to 2 centimeters; the limb is thin, but firm, shining, and smooth. The midrib is slightly prominent; the lateral nerves are alternate and fine. The floral leaves are shorter, sessile, elongated, narrow-elliptic and gradually reduced to short bracts.

Throughout the greater part of the year the cymes contain buds and flowers and fruits in different states of maturity. The flowers are hermaphrodite, with a convex receptacle, a short monosepalous cup-shaped and five-toothed calyx, and a monopetalous corolla, having a funnel-shaped tube and a somewhat bilabiate, five-lobed limb, the lobes being induplicate and contorted in præfloration, alternate with the calyx teeth, the two posterior ones narrower, the anterior ones larger than the others. The four didynamous stamens are inserted in the corolla tube; no fifth stamen or rudiment of it could be observed, although figured by Endlicher in *Iconographia*, and admitted by Bentham and Hooker. The filaments are flattened, somewhat broader at the base; the anthers reniform, attached by the inferior concave margin, and dehiscent by a single cleft, extending the entire length of the superior border. The ovary is superior, ovoid, two-celled, with a small disk at the base, surmounted by a cylindrical style, which terminates with a nearly entire stigma, and in each cell with twelve anatropous ovules. The fruit is a two-celled, fleshy, roundish, black berry of the size of a small pea, surrounded at the base with a persistent calyx and terminating above into a short point, formed by the base of the style. The seeds, of which two or four are in each cell, are elongated, reniform, larger at one end, brown, reticulate on the surface, and inclose under the hard but brittle integuments a rather abundant albumen, which surrounds the axile cylindrical curved embryo, pointing the radicle to the narrow end of the seed. The various parts described are illustrated by Fig. 36.

Duboisia myoporoides is difficult to classify. Endlicher places it in the order of *Scrophulariaceæ*, but Bentham and Hooker amongst the *Solanaceæ*, tribe *Salpiglossideæ*, near the genus *Anthocoris*, Labill. Excellent reasons may be advanced for each clas-

sification, the plant furnishing another proof of the close relation of the two natural orders, and of the impossibility of absolutely distinguishing them.—A. J. Ph., August, 1878, p. 387; from Bull. Gén. de Thérap., April, 1878.

FIG. 36.

Duboisia myoporoides.

Pitury.—Mr. James P. Murray, late surgeon to the Victoria Contingent Search Expedition into Central Australia, gives some further information on this Australian substitute for coca (see Proceedings, 1877, p. 138). Notwithstanding his constant endeavor during his extended journey, he has been unable to determine the plant from which the active component of pitury is derived. Regarding the name "pituri," he says that it is pronounced by the natives "pitch'ery." An interesting account of the uses to which it is applied by the natives, and the customs attending its use on occasions is also given. From the con-

fessedly rough and ready data which he has been able to collect he has always regarded this substance as a variety of *Nicotiana*.*—Ph. J. Trans., February 1st, 1879, p. 638.

Alkaloid of Pitury.—Mr. Gerrard had (Yearbook of Pharmacy, 1878, p. 594) recognized the presence of an alkaloid in pitury, which he named *piturin*, but which, by reason of the small quantity of pitury at his disposal, he was unable to subject to thorough examination. Mr. A. Petit, having received a large supply of pitury, has now been able to take up and complete the experiment of Mr. Gerrard, and has found the alkaloid to be *nicotina*. The alkaloid corresponded in all of its characters and reactions with *nicotina* from tobacco, and the analysis of its chloroplatinate proved conclusively the identity of the two.—Ph. J. Trans., April 5th, 1879, p. 819.

JASMINACEÆ.

Ligustrum Ibotu.—Dr. G. Martin, of the Pharmaceutical Laboratory of Tokio, Japan, has identified some seeds, which were stated to be coffee, to belong to the above plant. The seeds are about 2 mm. long and .1 mm. broad, convex on the back and irregularly furrowed, pointed at the ends, the points being united on the inner surface by a furrow. The outer integument is composed of a thin cuticula; this is followed by the epidermis proper, and the epidermis by a deposit of coloring matter which is soluble in water. The seed having been subjected to examination by various experimenters, and it having been stated that *caffea* was one of its components, Dr. Martin endeavored to isolate this alkaloid by the usual methods; but he failed to obtain *caffea*, obtaining, however, in its place a peculiar and well-defined glucoside, by treating the aqueous extraction with subacetate of lead, washing and drying the precipitate at 100° C. (= 212° F.), suspending it in alcohol, decomposing with sulphuretted hydrogen, and concentrating the alcoholic filtrate. The new substance constituted a tough, resinous mass, which was reducible to a white powder; it is nearly insoluble in cold water and in ether, but is readily dissolved by alcohol. He proposes to name it *Ibotin*. Besides this the seeds contain about 20 per cent. of fixed

* As already noted in Proceedings, 1877, p. 188, Baron von Müller has determined the pitury leaves to be those of *Duboisia Hopwoodii*, F. Müll.

oil, having great resemblance to olive oil. The ash of the seeds amounts to 3.422 per cent.—Arch. f. Ph., October, 1878, p. 338.

VERBENACEÆ.

Stachytarpheta Jamaicensis, Vahl (*Verbena jamaicensis*, L.).—This plant, a native of Jamaica, is used medicinally in Liberia, under the name of

Abortive Plant.—Dr. Roberts states that it is said to be used by the natives in form of tea to produce abortion, but he does not corroborate this statement from personal knowledge. In Jamaica, according to Barham, a decoction of the root is used as an emmenagogue, and the expressed juice is administered for worms in children and as a purgative. It is there known by the name of "vervain." Martius states that in Brazil, where the plant is known by the names "jarbão," "urgevão," or "orgibão," it is used for healing ulcers, and internally for rheumatic affections; while St. Hilaire states that it is taken by some people as tea, and has been sent to Europe under the name of Brazilian tea. He is of the opinion that it is about equal in medicinal value to common vervain—*Verbena officinalis*.—E. M. Holmes's "Note on Liberian Drugs," in Ph. J. Trans., April 19th, 1879, p. 853.

LABIATÆ.

Salvia Columbariæ.—This plant is the *chia* of the Mexicans and Indians of Arizona and New Mexico. The seeds are used by them as food and medicine. Steeped in water they form a very nutritive drink for the sick. In the form of mush they resemble flaxseed in properties and taste. In Mazatlan, Mexico, a drink prepared from the seed is sold in the streets. The meal forms a fine poultice for wounds, etc.—Dr. E. Palmer, A. J. Ph., November, 1878.

Trichostemma Lanatum.—The leaves of this plant, called by Mexicans and the Indians of Southern California *Romero*, are used by them to impart a dark or black color to the hair, and to promote its growth; a strong decoction being made and frequently applied to the hair. It is a very beautiful plant, with bright-blue flowers, which emit a strong odor of hops.—Dr. E. Palmer, A. J. Ph., December, 1878.

Audibertia Polystachya, the *white sage* of California, is very

abundant in many parts of the State. From its flowers the bees make the celebrated honey for which San Diego is so famous. The Indians gather them, and cook them with other substances to impart flavor, as we do with parsley.—Dr. E. Palmer, A. J. Ph., November, 1878.

Micromeria Douglasii (*Yerba Buena of the Mexicans*).—This interesting plant, growing near the seacoast of California, is a favorite medicine with the Mexican population of California. It has a strong minty smell. The Indians prepare a tea from it, which is used for fevers and colds. In case of headache, a quantity of the plant is bound round the head.—Dr. E. Palmer, A. J. Ph., December, 1878.

BORRAGINÆ.

Lithospermum Erythrorhizon—*Examination of Red Coloring Matter*.—M. Kuhara, Assistant in the Laboratory of the University of Tokio, Japan, has subjected the root of this plant, and the red coloring matter obtained therefrom, to chemical examination, the details of which are given. The Japanese give the name "Shikon" (*i. e.*, purple root) to this root, which is found in commerce in the form of thick lumps, of a beautiful purple color on the outside, but yellowish-white within. It was formerly largely used for dyeing "Tokio purple," but on account of the fugitive character of this color, and from the recent introduction of anilin colors, its use has been almost entirely abandoned. The proximate analysis of the air-dried root gave the following results: Moisture, 15.75; ash, 11.36; glucose, 9.93; invert sugar, 3.92 per cent.; aqueous extract, 21.13, and alcoholic extract, 14.68 per cent. The aqueous solution contained, besides sugar, a green coloring matter, which could be precipitated by acetate of lead, but was not further examined. Almost the whole of the red coloring matter was found in the alcoholic solution, and possessed properties closely resembling those assigned to the coloring matter of alkanet, *Anchusin*, to which Dr. Bolley gave the formula $C_{35}H_{40}O_8$. It was prepared by the method recommended for anchusin. The new coloring matter, however, differs in some of its color reactions considerably from anchusin, and it fails to agree with this also in its composition, which corresponds to the provisional formula $C_{30}H_{30}O_{10}$. Further experiments are in progress.—J. Ch. Soc., January, 1879, p. 22.

Tiaridium Indicum, Lehm.—(*Heliotropium Indicum*, L.).—This plant, a native of tropical Asia and America, is used medicinally in Liberia under the name of

Erysipelas Plant.—According to Dr. Roberts, it is used in the following manner: The inflamed part is fomented with an infusion of the leaves, and some of the fresh leaves are steamed or bruised into a pulp, and are applied to the part or bound around it. This is repeated twice a day, and is said soon to reduce the inflammation and heat. In the Mauritius, the leaves, bruised and mixed with common salt and applied in form of poultices, are said to have a diuretic effect. According to Ainslie ("Materia Medica"), the plant is used in India as an application to gum-boils, to repel pimples in the face, and in certain forms of ophthalmia. In Cochin China it is used for similar purposes. In Jamaica it is called "clary," and is used for cleansing and healing wounds and ulcers. Martius also speaks highly of its medicinal properties.—E. M. Holmes's "Notes on Liberian Drugs" in Ph. J. Trans., April 19th, 1879, p. 853.

Symphytum Asperrium.—In a paper on the progress of agriculture in Natal, South Africa, Dr. P. M. Sutherland speaks of the advantages possessed by the Caucasian prickly comfrey (*Symphytum asperrium*) as a fodder-plant, in regions characterized by annually-recurring seasons of drought. The plant is allied to the borage, is a native of the mountainous regions of Circassia, and has long been used as forage both in that country and in Russia. Its original home is at a height of 4000 feet above the sea, but it thrives well in a great diversity of climates, and bears hot and dry seasons with impunity on account of the depth to which its strong roots penetrate into the ground. There are two varieties of the plant, one with a hollow and the other with a solid stem. The latter is excellent food for stock of all kinds. It grows with marvellous rapidity and luxuriance; land which yields eight tons of grass per acre gives from sixty to a hundred and fifty tons of (green) comfrey. The plant is four or five feet high when near flowering, and the leaves attain a length of three feet. The flowers abound in honey. The solid stem is like a succulent root, and the plant is easily propagated by cuttings from this stem containing a couple of eyes. When once well-rooted it will go on producing from fifteen to twenty years. The fodder may be cut six or even eight times a year, and if the

leaves are stacked green, or partially dried, with a little salt between the layers, they keep well through the winter.—Drug. Circ., February, 1879, p. 53.

CONVOLVULACEÆ.

Scammony—Composition of Three Commercial Samples.—C. Goværts has obtained the following as the result of his examination of three samples as found in the French market :

Resin,	.	.	.	.	.	85	20	8
Gum,	.	.	.	.	.	4	10	3
Starch,	.	.	.	.	.	—	63	75
Mineral matter, etc.,	.	.	.	.	.	11	7	14

He favors the abandonment of scammony and its substitution by the resin prepared from scammony root.—A. J. Ph., October, 1878, p. 478 ; from Rép. de Pharm., August, 1878.

BIGNONIACEÆ.

Sparattosperma Leucantha, Mart.—Analysis and Medicinal Value.—Dr. Theodore Peckolt advocates the introduction of the leaves of this handsome, tall, Brazilian tree into European medicine. It is locally called *cinco folhas* (five-leaf), a name which it unfortunately shares with a number of Brazilian plants, and must not be confounded with the “cinco folhas” of Martius (*Cybistax anti-syphilitica, Mart.*), or of Nicolaú Moreira (*Bignonia depauperata*), both of which are employed as antisyphilitics. The leaves of the present plant are valuable on account of their powerful diuretic properties, and are used extensively in diseases of the spleen, and particularly of the liver. The usual form of exhibition is in the form of infusion, 60 grams of the leaves to 500 grams strained liquid, given during the day in teacupful doses ; or as tincture (1 : 5), a teaspoonful 3 or four times a day. Dr. Peckolt gives the remedy in the form of pills, alcoholic extract (10 grams made with powdered leaves into 100 pills), 1 pill every 2 hours. He has subjected the fresh leaves to proximate analysis, and finds them to contain in 1000 parts : Moisture, 640.020 ; greenish-brown resinous acid, 36.770 ; resinous substance, chlorophyll, pectic bodies, 100.000 ; albumen, 5.960 ; *sparattospermin*, 28.846 ; extractive matter, 25.570 ; extract, etc., 40.200 ; cellulose, 89.544 ; inorganic salts, 33.090. Tannic acid was not found.

The quantity of aqueous extract yielded by the fresh leaves was 16 per cent. ; of alcoholic, 6 per cent. ; the dry leaves yielded 22 per cent. aqueous, or 9 per cent. alcoholic extract. The dried leaves yielded 2.6 per cent. sparattospermin, while the fresh leaves, as above stated, yielded 2.884 ; the dry twigs yielded only 0.0325 per cent. In former correspondence Dr. Peckolt had mentioned

Sparattospermin, under the name of *bignonin*, the classification of Velloso as *Bignonia leucantha* being the only one then known to him. The new substance crystallizes in fine lustreless needles ; has a bitterish, faintly alkaline taste, and is odorless. Heated upon platinum foil it melts, forming a clear liquid, and when brought in contact with flame burns brightly and leaves no residue. It is readily soluble in absolute alcohol and in boiling alcohol of 0.830 to 0.834, and does not again deposit from the latter liquid on cooling. It is insoluble in cold water and in chloroform ; petroleum-ether and warm amylic alcohol dissolve only traces ; it is also sparingly soluble in boiling water, from which it is again deposited on cooling. Its alcoholic solution gives no reaction with tannin, chloride of gold, chloride of platinum, phosphomolybdic acid, tincture of iodine, nitrate of silver, acetate of lead, or bichromate of potassium ; but, if to a mixture with the latter a few drops of sulphuric acid are added, an apple-like odor is developed. Corrosive sublimate, as also mercurous nitrate, give white precipitates. Sparattospermin is not dissolved by acetic acid, either cold or hot, but the acid acquires a faint yellow color ; sulphuric acid colors the substance yellow, then brown, and finally dissolves it with a red-brown color. Nitric acid rapidly forms a clear, colorless solution, which in five minutes shows a green fluorescence, then violet-green, with brown-green fluorescence, and, after several hours, rose red ; upon the addition of water the color-reaction disappears, the liquid becomes colorless, and after twenty-four hours a faint-colored precipitate deposits. Oxalic acid gives no reaction. Hydrochloric acid, no reaction cold, but on boiling a milky fluid is formed which deposits a flesh-colored precipitate on cooling, becoming darker in twenty-four hours. Ammonia dissolves it rapidly, forming a colorless solution, which subsequently becomes reddish-yellow, and upon the addition of acetic acid disappears again without precipitation.

Sparattospermin is a neutral substance, and not a glucoside. Professor Geuther has subjected it to ultimate analysis, and ob-

tained figures which correspond to the formula $C_{19}H_{24}O_{10}$ ($O=16$). It consequently corresponds in its composition very nearly to phloridzin, from which, however, it differs in not being split by boiling acid into glucose, etc., and in its melting-point, which is 245° C. ($=473^{\circ}$ F.), while that of phloridzin is 106° – 109° C. ($=222.8^{\circ}$ – 228.2° F.). Dr. Peckolt has found it diuretic in doses of one to two grains.—*Zeitschr. Est. Ap. Ver.*, August 10th, 1878, p. 361.

APOCYNACEÆ.

Apocynum Cannabinum.—The Indians of Southern Utah, California, and Arizona use the fibre prepared from the stems of this plant to make ropes, twine, and nets, and before the advent of Europeans it was used in the manufacture of various articles of clothing. In order to remove the fibre the woody stems are first soaked in water, the part with the bark is then easily removed. The latter being washed off, leaves a soft, silky fibre of a yellowish-brown color, which is very strong and durable.—Dr. E. Palmer, *A. J. Ph.*, December, 1878.

Apocynum Cannabinum—*Examination of Precipitates in Alcoholic Preparations*.—Mr. J. U. Lloyd has observed that when a tincture or a fluid extract of the root of *Apocynum Cannabinum* is permitted to remain quietly, a white substance separates and is deposited upon the bottom of the vessel, and on that portion of the vessel exposed to light. The peculiar appearance of the substance led the author to examine it. It appears in little aggregations, which increase regularly, each radiating from a central point, appearing like aggregations of minute crystals until close examination shows them to be destitute of crystalline form. Interspersed throughout this mass, however, are found numbers of transparent crystals, some being quite large. These have proved to be cane-sugar. The amorphous matter is resinous in its character. It is white, tasteless, inodorous, insoluble in water, freely soluble in bisulphide of carbon, benzin, chloroform, and ether; soluble in hot alcohol, slightly in cold alcohol, and in glacial acetic acid. Sulphuric acid dissolves it with decomposition and effervescence, forming a dark-brown solution having that peculiar greenish fluorescence possessed by crude petroleum, which it resembles in its appearance. When this solution is diluted with water, a black oleaginous substance, having the odor of coal tar,

separates on the surface, the underlying liquid having a rose tint.—A. J. Ph., May, 1879, pp. 234–237.

Bidara Laut.—During the past few years this drug has been the subject of discussion and examination by various Dutch chemists, by whom it is referred variously to be a species of *Zizyphus* (Rhamnaceæ), *Strychnos ligustrina*, and *Eurycoma longifolia*, Jack. It has been examined by Wattez and Backhoven, J. D. Vrijdag Zijnen, and Dr. E. A. Van der Burg, all of whom have found this wood to contain brucia. It has been reported also (by Mr. Vrijdag Zijnen, Jr.) to contain strychnia, but this is stated by Dr. Van der Burg to be a misinterpretation of the elder Mr. V. Zijnen's analysis, which had been made in conjunction with Dr. Van der Burg. Mr. Henry G. Greenish, having obtained a sample of this drug from Mr. Vrijdag Zijnen, has now subjected it again to examination, and has found it to contain brucia, but not strychnia. The brucia was found present in the dry wood to the amount of 2.26 per cent. in the anhydrous state, while the dry bark contained 7.36 per cent. of anhydrous brucia. These percentages of brucia in the wood, and particularly in the attached bark, and their freedom from strychnia, would, therefore, point to this drug as a source of pure brucia in cases in which such may be required.

Bidara Laut is largely used in India as a popular remedy for dysentery, the people being in the habit, according to Mr. Vrijdag Zijnen, of scraping a spoonful and taking it in a glass of water. The sample examined by Mr. Greenish consisted of part of the trunk or branch of a small tree, with small eccentric pith, exceedingly hard wood, and thin, dark-gray bark, in some places exfoliating, but in others adhering to the wood with great tenacity. The wood lost 6.67 per cent. and the bark 11.23 per cent. of moisture in drying. Professor Russow, of the University of Dorpat, has undertaken the microscopic examination of the sample, the result of which, along with the presence of brucia, places it beyond doubt that the plant from which it is derived is a *Loganiaceæ*, and that the author therefore accepts *Strychnos ligustrina* to be the plant, as was believed by Mr. Vrijdag Zijnen.

Mr. Greenish has also had opportunity to subject the wood and bark of *Strychnos Colubrinum* to a comparative examination. The specimen, which was formerly in the Martiny Collection of Drugs, consisted of a large portion of the tree trunk, about 12 inches long and 3 inches in diameter. The wood was not as com-

pact as that of *Strychnos ligustrina* (Bidara Laut), hollow in the centre, the wood bordering on this hollow part being black, extremely hard, and entirely destitute of the bitter taste that characterized the remainder of the drug. The analysis of the wood gave: moisture, 9.02 per cent; alkaloid, composed of both brucia and strychnia (calculated for dry wood), 0.96 per cent. The bark: moisture, 9.19 per cent.; alkaloid in dry bark, 5.54 per cent.

Two samples of the bark of *Strychnos nux vomica*, formerly known as false angustura bark, were also examined; one young and comparatively thin, the other old and thick. The analysis gave for the young bark, 7.79 per cent. moisture, and 3.10 per cent. alkaloid (calculated as anhydrous brucia for dry bark). The old bark, contained 7.33 per cent. moisture, and yielded dry 1.68 per cent. of alkaloid. Dragendorff had found in a sample of the same bark, that would occupy, in regard to age and thickness, an intermediate position between the two examined by Mr. Greenish, 2.4 per cent. brucia in addition to a small amount of strychnia.—Ph. J. Trans., June 14th, 1879, p. 1013.

Curare—Quality.—Dr. Albert N. Blodgett writes that the quality of this drug is subject to great variations, some specimens being nearly worthless. He has obtained most satisfactory results from solutions of that solid extract which presented a brittle fracture, and was of a glistening, dark-brown color. The most useful form for subcutaneous use seems to be a solution of all portions of the drug in distilled water. A sediment is deposited, which does not need to be disturbed in using the solution. A dose of such a solution, containing from 0.0075 to 0.01 gram of curare, will usually prove sufficient for an ordinary speckled frog, and is about one-sixth the maximum dose to be used in the treatment of tetanus. Considering the rapidity with which curare is eliminated, Dr. Blodgett thinks a larger dose might well be used, and that it should be frequently repeated.—New Rem., November, 1878, p. 323; from Boston Med. and Surg. Jour.

Mongumo Bark—History and Analysis.—Professor Dragendorff, at the request of Mr. E. M. Holmes, has subjected a sample of bark to chemical examination, the origin of which is in doubt, but the history of which, as communicated by Mr. Holmes, is as follows: In March, 1877, some specimens of bark were presented to the Museum of the Pharm. Society (of Great Britain) by Mr.

Chantier, who informed Mr. Holmes that it came from Marseilles, and was entered in the London Docks under the name of *mongumo bark*. Upon inquiry, it was found in the hands of Messrs. Lewis & Peat, drug brokers, who supplied Mr. Holmes with a sufficient quantity for analysis, and informed him that it came originally from Madagascar, but that nothing was known of its properties except that it was supposed to be used medicinally. Its brilliant yellow color suggested the possibility of its containing chrysophanic acid, which a few preliminary experiments by Mr. Holmes proved, however, not to be the case. It seemed to possess some little interest, because in a note on purree in a former volume of the "Pharm. Journ. and Trans." (1), vol. iv, p. 417, casual mention is made in the following words, of a bark, the description of which seems to correspond with mongumo bark: "In the year 1787, a ship laden with timber brought the bark of a tree from the coast of Africa, yielding a beautiful yellow pigment; the tree whence this bark was derived, and the coloring properties of its sap, was discovered by chance, but the settler who made the discovery died, and the tree was thus lost." Mr. Holmes further adds, that he saw a sample of the bark amongst the French colonial products in the International Exhibition at Paris last year, which was labelled

Ochrosia borbonica, and closely resembled in appearance mongumo bark; but of this he was unable to procure a sample, and he has no certain knowledge that the two barks are identical.

Professor Dragendorff's analysis showed the presence of the following constituents in mongumo bark: moisture, 16.19; ash, 2.92; soft fat and traces of ethereal oil, 0.62; waxy substance, traces of chlorophyll, 1.73; resin, soluble in chloroform, 0.93; *mongumic acid*, 23.42; resin, insoluble in ether, soluble in alcohol, 6.64; *glucoside*, soluble in water and alcohol, 0.61; substance insoluble in alcohol and soluble in water: mucilage, 0.72; metarabic acid, 0.76; phlobaphen, 0.02; oxalic acid in combination with calcium, 0.73; mucilaginous substance (?) soluble in HCl, 0.52; starch and other saccharifiable substances, 8.08, cellulose, 14.91; suberin, etc., 16.73; proteinaceous substances, 3.47 per cent. Of these

Mongumic acid is certainly the constituent to which the yellow color of the bark, as well as any medicinal activity which it may possess, is due. It was obtained by extracting the powdered bark with ether free from alcohol, evaporating the ethereal solution, treating the residue of evaporation with 85 per cent. spirit,

removing undissolved colorless wax by filtration, evaporating filtrate, dissolving the residue of this evaporation in alcohol of 50 per cent., adding ether to the filtered solution, and then water to separate the ether which holds the mongumic acid in solution. Upon now evaporating the ethereal solution the mongumic acid is left as a yellow amorphous substance, soluble with difficulty in boiling water, but easily in aqueous solutions of ammonium, potassium, and sodium hydrates or their carbonates, and also in lime and baryta water. All these solutions are of a red-brown color, and yielded the acid to ether only when acidulated with acetic or hydrochloric acid; in the latter case easily and completely, and, *vice versa*, the ethereal solution parts with the acid when shaken with an aqueous solution of potassium carbonate. The solution of mongumic acid in spirit of 50 per cent. is colored black-brown with ferrous and ferric salts; with basic acetate of lead it gives a yellow precipitate; none with neutral acetate of lead, nitrate of silver, or perchloride of mercury; with acetate of copper a brown precipitate. Petroleum ether precipitates the mongumic acid from an ethereal solution, and if the previously mentioned vegetable wax (and fat) be present as impurity they remain in solution after the filtration from the yellow precipitate. In benzine and in chloroform the mongumic acid is almost insoluble. The alcoholic solution with iodine becomes darker colored, with bromine gives a decomposition product difficultly soluble in alcohol. The taste of the acid is bitterish and strongly astringent. It loses 8.79 per cent. of moisture when exposed over sulphuric acid for several days, and 9.77 per cent. at 116° C. (= 240.8° F.). The analysis leads to figures which approach the formula $C_{12}H_{10}O_4$, but the quantity of acid was insufficient to determine the formula of the molecule.—Ph. J. Trans., April 5th, 1879, pp. 816–818.

SAPOTACEÆ.

Argania Sideroxylon.—Mr. Consul Drummond Hay, referring to the great scarcity of food in Mogador at the beginning of the year (1878), the result of a visit from locusts followed by drought, speaks of the services rendered to the natives and their flocks at such times by the argan tree. From the seeds of this tree the natives extract an oil that is used for cooking and lighting purposes. When ripe the fruit, which is an egg-shaped drupe, falls from the trees, and the goats then enter into competition

with their masters for a share of the harvest. The goats, however, only swallow the fruit for the sake of the sub-acid rind, and being unable to digest the hard seeds eject them during the process of ruminating, when they are gathered and added to the general store for oil-making. In preparing the oil the natives crack the "stones," toast the kernels in an earthenware dish, and then grind them to flour. A paste is then made by stirring this flour with water, from which, after being allowed to harden, the oil is obtained by pressure.—Ph. J. Trans., October 5th, 1878, p. 262.

STYRACEÆ.

Lotur Bark—Components.—According to O. Hesse lotur bark—the bark of *Simplocos racemosa*—contains three alkaloids, viz.: *loturia*, 0.24 per cent.; *colloturia*, 0.02 per cent.; and *loturidina*, 0.06 per cent. They are extracted from the bark by hot alcohol and are converted into acetates. *Loturia* and *colloturia* are precipitated from the neutral solution by the addition of sulphocyanate of potassium, leaving *loturidia* in solution. The crystalline precipitate is decomposed with soda, the alkaloids are extracted with ether, and recrystallized from alcohol. The efflorescent crystals of *loturia* are separated mechanically from the non-efflorescent crystals of *colloturia*.

Loturia is soluble in alcohol, ether, chloroform, and acetone; but is insoluble in water, ammonia, and caustic soda. It gives no coloration with ferric chloride, strong sulphuric or nitric acid, or even on the addition of bleaching-powder and ammonia. It melts at 234° C. (= 453.2° F.), and sublimes, forming colorless prisms. The fluorescence exhibited by a solution of *loturia* in dilute acids is more intense than that of sulphate of quinia. *Loturia* forms well-crystallized salts. The hydrochlorate, which crystallizes in white prisms soluble in alcohol and in water, forms double salts with the chlorides of platinum, of gold, and of mercury. The hydriodate forms a crystalline double salt with mercuric iodide. The nitrate, sulphocyanate, acetate, chromate, and picrate, are crystalline compounds. The tannate and phosphotungstate are amorphous powders.

Colloturia is deposited from alcohol in prisms terminating in pyramids, which sublime at 234° C. (= 453.2° F.). The solution of the alkaloid in dilute sulphuric or hydrochloric acid is fluores-

cent. Chloride of gold produces a yellow amorphous precipitate in the solution of the hydrochlorate.

Loturidia is obtained from the filtrates from the sulphocyanates of loturia and colloturia by rendering it alkaline with ammonia and extracting with ether. Loturidia is a yellowish-brown amorphous body, yielding amorphous salts. It dissolves in strong nitric and sulphuric acids, forming yellow solutions. The solution in dilute acids is fluorescent.

Winkler's *californine* was not a simple body, but a mixture of the acetates of these three alkaloids.—Ber. d. d. Ch. Ges., 11, pp. 1542–1546.

Benzoin—Character of the Association of Benzoic Acid in the Drug.—According to Chr. Rump benzoic acid is not contained in benzoin in the free state, but is always united to a second acid, on which account the method of sublimation as practiced hitherto is designated by him as crude and irrational. A uniform and effective preparation can only be obtained by the wet method and subsequent sublimation. The author is of opinion that all commercial benzoic acids are mixtures of natural with artificial acid.—Zeitschr. Est. Ap. Ver., August 10th, 1878, p. 365.

Benzoin—Presence of Vanillin.—Chr. Rump (Ber. d. d. Ch. Ges., 1878, p. 1634) obtained from Siam benzoin a substance which had the properties of vanillin, and which P. Jannasch has since determined to have also its composition. To obtain it 2 parts of Siam benzoin and 1 part of hydrate of calcium are mixed with water to form a paste, boiled, strained, the benzoic acid precipitated from the strained liquid by hydrochloric acid, and after the removal of the benzoic acid the acid liquid shaken with ether. The ethereal solution leaves the vanillin on evaporation.—Ph. Centralb., April 17th, 1879, p. 164.

Alstonia Constricta (F. Muell.).—The presence of an alkaloid in the bark of the Australian *Alstonia constricta* has already been pointed out by Mueller and Rummel, who have described it and named it *alstonina*. Hesse afterwards disputed the correctness of the results of these authors, and expressed the opinion that the supposed alkaloid was a mixture of "chlorogenin" and "porphyrin." Oberlin and Schlagdenhauffen have now announced the isolation of two alkaloids—one crystallizable and the other amorphous—from *A. constricta* bark. The bark yielded to successive treatment with solvents: to ether, 1.038; to alcohol, 27.740; to

water, 1.375; the hygrometric moisture was 8.932; saline matter present, 9.748; and ligneous substance (by difference) 51.167 per cent. The alkaloids were separated from the ethereal portion by suitable means, the amorphous one being obtained from the final mother liquors. For the crystallizable alkaloid the authors have retained the name

Alstonina.—It is described as crystallizing in silky tufts of brilliant, colorless, isolated or stellate crystals. It is soluble in ether, alcohol, chloroform, benzin, acetone, and petroleum; insoluble in cold water, but rather soluble in boiling water, to which it imparts a bitter taste. The aqueous solution colors red litmus blue. Weak acids dissolve it completely, and it is precipitated from solution by all the alkaloidal reagents. The yield of this alkaloid is extremely small. The mother liquors from which alstonina has crystallized leave an alkaloidal residue, which, being amorphous and possessing a different behavior to mineral acids, producing color reaction, which alstonina does not, the authors consider to be distinct, though probably closely related. They propose for it, for the present, the name *alstonicina*.—Ph. J. Trans., June 28th, 1879, p. 1060; from J. de Ph. et de Chimie., June, 1879.

ERICINEÆ.

Vaccinium Macrocarpum—*Proximate Analysis*.—Mr. L. W. Moody, in view of the circumstance that immense quantities of cranberries are often rendered useless by being frozen, has made an analysis of the berry, and found the following result:

Pectous substances, 6.27 per cent.; seeds, skins, etc., 9.64 per cent.; *citric acid*, 2.27 per cent.; sugar, 2.23 per cent.; water, 82.23 per cent. There was found 1.25 per cent. of ash. No tartaric, malic, oxalic, or tannic acid could be found.

It was found that a good *cranberry jelly* could be obtained from the berries with less than the usual amount of sugar, if a portion of the juice was first rejected, so that the jelly should consist more largely of the pectous substance of the fruit. The juice from 100 pounds of the berries will yield about 2 pounds of citric acid; the residue is about 33 pounds of jelly; or the latter may be fermented and will yield spirit equal to about 1 pound absolute alcohol.—A. J. Ph., December, 1878, p. 566.

Arctostaphylos Tomentosa (the *Manzanita* of the Spanish).—The

fruit, which is produced in clusters, and resembles a small apple, has an agreeable acid taste, and is consumed largely by Indians and Mexicans, both in a ripe and unripe state. Indians dry the berries in great quantities, and prepare a favorite drink from them. A quantity is pounded until the pulp is separated from the seeds and outer rind, the flour or finely-pounded pulp is mixed with water, which is allowed to stand until fermentation takes place, when it becomes intoxicating. The dried fruit, ground to a fine flour, is formed into cakes with water, which are baked in hot ashes, and furnish a sweet bread, which, though not unpleasant to the taste, has a claylike, reddish-brown appearance. The seeds, after being deprived of their covering, are ground fine and made into mush. The Pah-Ute Indians use the leaves as tobacco, and for medicine.—Dr. E. Palmer, A. J. Ph., November, 1878.

COMPOSITÆ.

Artemisia tridentata, commonly called "sage brush," is used medicinally by the Pah-Ute Indians, in the form of strong tea, for headache, colds, and for worms. It is also a good stimulant, prepared either with water or liquor, and it yields a pungent oil, which would be a profitable article of commerce. A very penetrating oil, which is good for liniments, is also yielded by

A. filifolia, called *Southernwood*. The Pah-Utes make a decoction from the plant, which is excellent for swellings and bruises. These Indians also use the seeds of two other species,

A. ludoviciana and *A. dracunculoides*, as food. The seeds are ground fine and made into mush, which, however, is anything but a tempting dish, having a dirty look and strong taste.—Dr. E. Palmer, A. J. Ph., December, 1878.

Ubyæa Schimperii.—A. G. Geheeb again draws attention to an Abyssinian drug, which Professor Dragendorff (see Proceedings, 1878, p. 228) had, with certain reservations, referred to this plant. Mr. Geheeb, being in possession of a herbarium specimen of the plant, submitted it to Dr. Daniel Oliver, Director of the Herbarium of Kew, who pronounces the plant to be *Artemisia Abyssinica*, and to differ widely from *ubyæa*.—Arch. f. Ph., March, 1879, p. 226.

Insect Powder—Comparative Value of Various Species of Pyrethrum.—Mr. William Saunders has contributed a very interesting paper on *Insect Powder* to the "Canadian Entomologist,"

which is reprinted in "Am. Jour. Phar." (May, 1879, pp. 243-246), and from which the following is extracted:

The insect powders of commerce are the powdered flowers of different species of *Pyrethrum*. Those of *P. carneum* and *P. roseum* were introduced some thirty years ago under the name of Persian Insect Powder, and subsequently those of *P. cinerariæ-folium*, a native of Dalmatia, Austria, as Dalmatian Insect Powder. Both varieties are good insecticides, but the Dalmatian powder is much more energetic; and of the two species yielding the Persian powder, that from *P. roseum* is less active than that of *P. carneum*. This is accounted for in the fact that single flowers are much more powerful than double flowers, and that the latter occur in *P. roseum* in much larger proportion than in the other species.

The flowers, either whole or powdered, preserve their activity for a long period, no appreciable loss of activity having been noted by a recent European experimenter in samples which had been kept for six years, and they act very much slower in the fresh (undried) state than when dried and powdered. The plant itself is inactive. The property to destroy insect life appears to be confined to the genus *Pyrethrum*; and notwithstanding that there are many composite plants closely allied to this genus, none other seems to possess any value in this respect, and even among the *Pyrethrums* there are several species whose value as insecticides is very slight.

The *Pyrethrums* are hardy plants, which bloom abundantly the second year from seed. The powder is prepared from the half-opened flowers gathered during dry weather, and dried in the shade under cover; but the process of gathering, drying, and preparing involves so much time that their culture can only be made profitable where labor is cheap.

Insect powders are sometimes artificially colored to disguise their source, but all have owed their activity solely to the presence of the powdered flowers of one or other of these *Pyrethrums*.

The author devotes a considerable portion of his paper to his experiences and experiments with these powders as insecticides, from which it appears that the powder can be made available for the destruction of the common house-fly, as well as for the green aphid which troubles greenhouse plants. Further experiments in this direction will prove interesting and valuable.

Mr. W. L. Carpenter also relates his experiences with the Per-

sian insect powder of commerce, as well as with the powdered flowers of *P. roseum*. J. A. Lintner had expressed his opinion that the latter would prove unavailing if applied to the destruction of the *Anthrenus*. Experiments made by Mr. Carpenter, however, prove this view to be erroneous, since he has found both the powder of *P. roseum* and the commercial Persian insect powder to kill these insects. A *honey-bee*, placed like the *Anthrenus* under a glass slightly raised to admit air, and containing a portion of the powder, was perfectly helpless in fifteen minutes; a *mud-wasp* in eight minutes; a small species of *ant* in five minutes; a small species of *Pyralidæ* in twenty minutes; the large *Papilio asterias* resisted the effects of the powder for an hour, and on being released seemed to recover, but died next day; a *house-fly* became helpless in ten minutes; a *mosquito* in fifteen minutes; a *flea* in three minutes. Experiments made with a species of *Coleoptera* (*Diabrotica duodecimpunctata*), *Hemiptera*, *Poreus*, and numerous other insects, showed that all insects having open mouth parts are peculiarly susceptible to this powerful drug, and that death will result from the introduction into the mouth of the smallest quantity.—Ibid. p. 226.

Helianthus Petiolaris and *H. Lenticularis*.—These native sunflowers are known to the Pah-Ute Indians by the name of *Awk*. Their seeds form one of the staple articles of food for many Indians, and they gather them in large quantities. When parched and ground they are highly prized, and are eaten on hunting excursions. The agreeable oily nature of the seeds renders them very palatable. The meal or flour is also made into cakes, which are baked in hot ashes. They are of a gray color, rather coarse-looking, but very palatable and nutritious, as palatable as much of the corn bread eaten by the whites. The native sunflower of Utah yields an exudation from the stems of a creamy white color, nearly tasteless, and of a gummy nature, which is eaten by the Indians and white children of Utah, or rather chowed in place of pine gum. The common, large, cultivated sunflower, which is named by the Pah-Utes *Mokeack Sunflower*, after the chief Mokeack, who first planted them, is now planted by many of the Indians.—Dr. E. Palmer, A. J. Ph., November, 1878.

Polymnia Uvedalia.—This plant, commonly called "bears-foot," is mentioned by Dr. J. A. G. Clowes. He has used an ointment made by mixing ʒij of the fluid extract with ʒj of lard with favorable results in a case of enlargement of the spleen fol-

lowing a series of attacks of intermitting fever. The part of the plant used in the preparation of the fluid extract is not mentioned.—A. J. Ph., September, 1878, p. 453; from Med. and Surg. Rep.

Guizotia Oleifera, D. C.—*The Expressed Oil of the Seeds.* *Vernacular:* *Ramteel*, *Kalateel* (*Hind.*, *Beng.*, *Bomb.*), *Valesuloo* (*Tel.*).—This plant is commonly cultivated in the neighborhood of Bombay and in the Deccan as a monsoon crop. The oil is sweet and may be used for the same pharmaceutical purposes as sesamum oil. In the Concan it is much esteemed for culinary purposes and for making sweetmeats. The plant is annual, herbaceous, erect; leaves opposite, long, lanceolate, coarsely serrated; peduncles elongated, subcorymbose; flowers large, bright yellow; the achenes are of a grayish-black color, about $\frac{2}{10}$ of an inch long, somewhat angular from lateral compression, tapering towards the base, quite smooth. Taste, oily and nutty.—Professor W. Dymock, in Ph. J. Trans., June 21st, 1879, p. 1035.

Glossocardia Bosvallea, D. C.—The plant is known in Bombay by the name of "thatara-suva," which means rock anethum. In the Poonah and Sholapore districts it is called "Pitta-papada," a name also given to fumaria. Dr. S. Arjun, of Bombay, has found it growing on rocky ground towards Chinchpoogly, in the island of Bombay, during the rains. It is not sold in the Bombay shops, but is the pitta-papada of the Poonah druggists, and according to Dalzell and Gibson is much used in female complaints, the nature of which they do not specify. It is a small annual, with many stems, diffuse; leaves alternate, much divided, linear at the base; heads of flowers, solitary, yellow, on short naked peduncles. It has a bitter taste. Synonyms: *Verbesina bosvallea*, Linn.; *G. linearifolia*, Cass.—Professor W. Dymock, in Ph. J. Trans., June 21st, 1879, p. 1035.

Blumea Aurita, D. C.—*The Plant.* *Vernacular:* *Jangli-muli* (*Bomb.*), *Narak-karandei* (*Tam.*).—According to Mr. Modeen Sheriff this is an annual herbaceous or somewhat shrubby plant, found in every creek and corner, particularly along the walls of old ruinous buildings and in graveyards in India. The appearance of the young plant is so different from that of the old that some people, who are not acquainted with the fact, have thought them to be two distinct species. The size of the leaves is the chief cause of the difference; they are very large when the plant is young, and resemble those of the radish. When it is in

flower the leaves, except a few old ones near the root, become very small and quite sessile, with auricles or leafy appendages near their base, and the plant itself is much altered in appearance from numerous branches.

Professor Dymock observes that the medicinal properties of the various species of *Blumea* differ but little, all of them being, probably, more or less deobstruent and stimulant. One of the species yields the Ngai camphor, *Blumea balsamifera*, D. C., which inhabits the Moluccas and Ceylon as well as India. A strongly camphoraceous species, apparently *B. holosericea*, D. C., is common in the neighborhood of Bombay, and is used by the country-people to drive away fleas. The local name of this is "bhamburda."—Professor W. Dymock, in Ph. J. Trans., June 21st, 1879, p. 1035.

VALERIANACEÆ.

Nardostachys Jatamansi, D. C.—*The Rhizome. Vernacular: Balchar (Hind.), Jatamasi (Bomb., Beng., Tam.)*—This plant, in Sanskrit "jatamansi," has, from a very remote period, been in use amongst the Hindoos as a perfume and medicine. It is mentioned by Suscruta, and is prescribed by Hindoo physicians as a nervine tonic, and aromatic adjunct in the preparations of medicinal oils and ghrilas (butters). Arabic and Persian writers describe jatamansi under the name of sumbul and sumbul-i-hindi, the latter term being used to distinguish it from valerian, which is sometimes called sumbul. The author of "Makhzan-ul-adwiya" says that it is the nardeen of the Greeks, and compares the root to the tail of a sable. He considers it to be a deobstruent and stimulant, diuretic and emmenagogue, and useful in various disorders of the digestive and respiratory organs, and as a nervine tonic in hysteria. The Vytians, in Lower India, according to Ainslie, prepare a fragrant and cooling liniment for the head from the drug, and also prescribe it internally as a purifier of the blood. Sir W. Jones thought that the spikenard ointment of the ancients might have been made from *N. jatamansi*, and it is certain that it has been used for a similar purpose in India from a very early date. Sir W. O'Shaughnessy states, as a result of his experience with jatamansi, that it is a perfect representative of valerian. It is, therefore, very desirable that further trials should be made with this drug, which can be procured at small cost in almost all the bazaars throughout India. The drug, which

is brought from the mountainous districts of Northern India, consists of a short portion of the rhizome, about as thick as the little finger, of a dark-gray color, surmounted by a bundle of fine, reddish-brown fibres, the whole forming an object not unlike the tail of a sable or marten. The fibres are produced by an accumulation of the skeletons of the leaves, and are matted together, forming a kind of network; amongst them the remains of flower-stalks may be found. The odor of the drug is heavy and peculiar, like a mixture of valerian and patchouli; the taste bitter and aromatic. When the central portion is removed and cut across it is seen to consist of a thin cortical portion, connected with the central woody column by four medullary bands, between which are situated large canals, which contain the fibrovascular branches. The central woody column is of a red-brown color, angular, and jointed, having a certain amount of resemblance to the vertebræ in the tail of an animal.—Professor W. Dymock, in Ph. J. Trans., June 21st, 1879, p. 1034.

RUBIACEÆ.

Rubia Cordifolia, Linn.—*The Root.* Vernacular: *Majith*, *Manjit* (Hind., Bomb., and Beng.) *Manjitti Shevelli* (Tam.).—Madder is used in Hindoo medicine as a coloring agent; medicated oils are boiled with it to give them color. It is also a useful external astringent, and is applied to inflamed parts, ulcers, fractures, etc. Chakradatle recommends madder rubbed with honey as an application to the brown spots of pityriasis versicolor. The Sanskrit name for madder is “Manjishtha.” Under the names of “tuvvah” and “runas,” Arabic and Persian writers treat of madder, probably the produce of *R. tinctorum*, as the roots which come from Afghanistan appear to be identical with those of the European species. They do not, however, make any distinction between the species, but simply mention a wild and a cultivated variety. The Mohammedans consider the drug to be deobstruent, and prescribe it in paralytic affections, jaundice, obstructions in the urinary passages, and amenorrhœa. They mention the fruit as useful in hepatic obstruction, and a paste made from the roots with honey as a good application to freckles and other discolorations of the skin. The whole plant is alexipharmic; it is also hung up in houses to avert the evil eye, and tied to the necks of animals with the same object. The plant is common on

the higher Ghauts in the Bombay Presidency, but the Bombay market draws its supplies chiefly from Kelat and Sindo. The imported article fetches a higher price than that grown in India. Madder-root consists of a short stock, from which numerous cylindrical roots, about the size of a quill, diverge; these are covered by a thin brown suber, which peels off in flakes, disclosing a red-brown bark, marked by longitudinal furrows. The taste is sweetish at first, afterwards acrid and bitter. A transverse section shows the suber, within which is a parenchyma composed of tangentially extended cells, which are arranged in radiating lines, and gradually decrease in size until they become almost square where they join the cambium layer. These cells contain granular coloring matter and a few crystals of oxalate of lime. The wood is provided with numerous and large vessels.—Professor W. Dymock, in Ph. J. Trans., June 21st, 1879, p. 1033.

Oldenlandia Globosa, Hiern. — This plant, apparently somewhat similar in properties to ipecacuanha, is used in Liberia under the name of

Dysentery Plant.—It is also called “Kackeis.” By some the heads of small pale lilac flowers are chewed, or the leaves eaten like a potherb; others, however, make a strong decoction of the plant, of which two tablespoonfuls are given three times a day. The use of other plants of this genus is somewhat similar in other countries. Thus, in Brazil, one species is used for colic; in the East Indies, the fresh juice of another is used in diarrhœa.—E. M. Holmes’s “Notes on Liberian Drugs” in Pharm. J. Trans., April 19th, 1879, p. 853.

Remigia Ferruginea, D. C. (*Cinchona Ferruginea*, St. Hil.).—The bark of the root contains a peculiar bitter substance, acid in its character, which was first isolated by Dr. Vieira, and has on this account been named

Vieirin or *Vieirinic Acid*.*—This substance is recently frequently mentioned as a remedy in scrofula and rachitis, and various phar-

* This is another instance of the ridiculous custom of naming active constituents of vegetable drugs after some favorite author. Like in the instance of the active principle of pomegranate-bark—pelletierin—this substance completely loses its identity by the arbitrary name given it.—REP.

maceutical preparations are proposed. It is obtained from the bark, which is known in the province of Minas Geraes, Brazil, under the name of *Cortex Remijæ* (Quina de serra, da Campo), by extracting the powder, previously mixed with half its weight of hydrate of lime, with boiling water, treating the decoction with hydrochloric acid, collecting the precipitate, and treating it with animal charcoal. Recently prepared it is white, but by exposure to air and light, becomes colored. While moist, it has the peculiar pleasant odor of the bark, but is odorless when dry. It is insoluble in water, ether, and the volatile oil, is very sparingly soluble in fixed oils, but readily dissolved by alcohol and chloroform. It reacts acid, and forms soluble compounds with the alkalies.

A *tincture* is prepared by dissolving 1 part of vieirin in 10 parts alcohol.

A *syrup*, by dissolving 3 parts vieirin and 3 parts hydrate of lime in sufficient water and sugar to make 300 parts of syrup. Owing to the unpleasant (bitter?) taste of this syrup some appropriate aromatic is added.

Wine and *elixir* are also prepared.—Ph. Centralh., January 9th, 1879, p. 12.

Cinchonas—Distribution in South America.—Mr. G. Roessing gives a concise account of the distribution of cinchonas in South America, which is accompanied by a handsome colored map indicating the localities of the more important species. The Cordillera de los Andes is divided into two parallel ridges, the western coast range and an eastern range of very high mountains. While the western range is exceedingly arid, the eastern produces profuse vegetation, owing to regular irrigation and the prevailing warm and humid winds, and it is only upon this, the so-called rainy section, extending from 10° N. latitude to 20° S. latitude that the cinchonas are found, forming a belt of evergreens, at a height of 1200 to 3500 meters, which is called the eyebrow (ceja) of the mountains. The most northern species is *C. cordifolia*; the most southern is stated by Wedell to be *C. australis*, which he found as far south as 22° S. latitude. With the exception of *C. lancifolia* and *C. cordifolia*, which grow in the valleys of the Magdalena and its tributaries, the cinchonas are at present very inaccessible, and their transportation is exceedingly difficult; and this will continue until the numerous tributaries of the Amazon shall be open to commerce. The

plants yielding the cinchona barks of commerce are, according to Flückiger and Berg, the following:

Cort. cinch. regia,	C. Calisaya,
“ “ Loxa,	“ macrocalyx,
“ “ “	“ heterophylla,
“ “ “	“ Chahuarguera,
“ “ “	“ Uritusinga,
“ “ Huanoco,	“ micrantha,
“ “ Huamalies,	“ scrobiculata,
“ “ “	“ Condaminea,
“ “ flava dura lævis,	“ cordifolia,
“ “ “ “ suberosa,	“ lutea,
“ “ “ fibrosa,	“ lancifolia,
“ “ rubra,	“ succirubra,
“ “ rubiginosa,	“ pubescens.

—Arch. f. Ph., August, 1878, p. 97.

Cinchona—*Cultivation*.—In previous reports the various experiments and results of the efforts made to introduce the cinchonas in different parts of the world and by different governments, have been referred to as occasion required. In the “Druggists’ Circular” for July, 1878, a historical review of the cultivation of cinchonas is now given, which will be read with interest. The writer of this review sums up as follows:

“The transplantation of cinchonas may now be considered a decided success. Its profitableness depends on the cultivation of those species which yield a superior description of bark, with the largest yield of quinia, and in as pure a form as possible, due regard being had to the amount of *crystallizable* quinia which a given bark yields. Until recently, too much stress seems to have been laid on the largest percentage of alkaloids, although the commercial value certainly depends on the actual percentage of quinia. Finally, the supposition that the valuable cinchonas would soon be exhausted has been proved by late researches to be groundless, since new forests have been opened in Bolivia and New Grenada. There is no scarcity, but, on the contrary, a great abundance of the inferior barks exported from South America.”

During a botanical tour around the world Dr. Otto Kuntze, in July, 1875, visited the cinchona plantations of Java, and later those of Mungpo (Sikkim), British India, where he made careful studies of the variations presented by the different species

of the family. He was the first botanist who made critical comparisons on the spot between the products of the Dutch and English plantations, and has thereby been enabled to enrich our knowledge with many facts regarding the genus *Cinchona*. His researches on the true original species of cinchona led him to results which may upset most of the present systematic arrangement.

On conditions of growth and cultivation of the cinchonas the author says: "It is only a few years since the Dutch have commenced to reap the reward of their unceasing efforts to introduce cinchona cultivation in Java; the experiments are said to have cost several millions of gulden before they yielded a regular paying return. In former times long passages were cut in all directions through the virgin forests, along which the young trees were planted. This method was, however, found to be too costly, particularly as the trees were soon injured by wild animals. After this over a million of a young, shrubby cinchona were planted, which yielded a very inferior bark, and has now been entirely uprooted. During several years, in the beginning, efforts were made to locate plantations on the mountain Pangerango, but, in consequence of the rocky character of the soil and the thin layer of humus, all attempts in this direction failed. The methods of cultivation, however, at present in use upon Java are most advantageous and superior to that followed in the British plantations in India. The trees are now planted, like our fruit trees, in rows upon gently-sloping clearings in the forests at an altitude of 5000 to 6000 feet. On sowing cinchona-seeds in lowlands in the tropics the plants spring up quite rapidly in consequence of the warmer climate, but they flower too soon, die off, and never bear seed. Their bark also contains very small quantities of quinia. The plants require shade only while young, hence they are allowed to grow for about three years with the taller trees, which are about 13 to 20 feet apart. The latter are then about six years old, and are cut down to obtain the bark; their roots are dug up and new seedlings, which have been raised in hothouses to a height of 4 to 8 inches, are planted in their place. If the trees are allowed to get over six years of age the bark loses its value, as has been shown by experience. The gigantic trees of the virgin forest, which were formerly left to give shade to the young plants, are now everywhere cut down, as the method just described has been found more advantageous." The author

never saw any cultivated cinchona trees thicker than 8 inches or taller than 43 feet, while those of South America have been observed sometimes to reach a diameter of 40 inches and a height of 133 feet. Those species which are rich in quinia appear to require a temperature of 12° to 20° C. ($= 53.5^{\circ}$ to 68° F.), and certain daily, alternating winds. *Cinchona succirubra*, which contains but little quinia, does not require these conditions. All species thrive well in Java; in most other localities, however, only the last-mentioned species has been successfully cultivated.

According to the last official report which had reached the author (July, 1876), there were in Java 2,012,187 cinchona trees, namely: 223,000 *C. Calisaya-Ledgeriana*, 1,001,670 *C. Calisaya-Hasskarliana*, 177,433 *C. succirubra* and *C. caloptera*, 565,336 *C. officinalis* and *C. officinalis-Pahudiana*, 44,036 *C. lancifolia*, and 512 *C. micrantha*.

The British-Indian plantations contain mostly *C. Howardiana* (*succirubra*), which contains only about 1 per cent. of quinia, but 3 per cent. of cinchonina. The number of trees in the British plantations is estimated at 10 to 12 millions.

In Ceylon *C. officinalis* is cultivated besides *C. Howardiana*. *C. Calisaya* is said not to thrive well there, nor have the attempts to propagate this species in the Himalaya plantations been crowned with success. The fact that a too warm climate diminishes the percentage of quinia in cinchonas has been confirmed by the attempts at cultivation made on Sumatra and Mauritius, as the highest localities which could be utilized were at an altitude of only 2700 feet. In other countries the cultivation of cinchona trees has also been attempted, so far, however, without any decided results; so in California, Mexico, Jamaica, Algiers, Cape Verde, St. Helena, Réunion, St. Antao in Africa, Burmah, Queensland, and Peru.

Hybrids.—The author observes that, in general, vegetable hybrids or bastards are more rarely met with in the tropics than in the colder zones. Contrary to this rule, however, hybrids of the cinchona family are more commonly met with than the mother plants themselves. He knows from actual observation that at least one-half of all cultivated cinchona trees are bastards; they are produced spontaneously in such numbers as to have become a nuisance to planters who desire an unmixed crop. The derivation of these hybrids, especially in Java, is entirely beyond doubt, be-

cause only the seeds of well-known and clearly-defined species are used for planting. In the course of his researches on this subject the author has arrived at the following two important facts :

1. *The percentage of quinia is increased in the hybrids.* In the mixed organism of a hybrid certain constituents appear to be unnecessary or unsuitable, thus producing variations; for instance, in the percentage of the various alkaloids. In the cinchona plantations of India and Java it was noticed at an early period that the new species were richer in quinia than the parent trees. Analytical laboratories are therefore now connected with all the larger plantations, and only the seeds of those trees are used for propagation which yield the most quinia. In consequence of this system the market now affords barks of 3 to 5 per cent. of quinia, instead of $\frac{1}{2}$ to $1\frac{1}{2}$ per cent. as formerly.

2. *The percentage of quinia in the bark increases in direct ratio with the degree of irregularity of the hybrid,* that is, in proportion as the individual characters of the parents are separately recognizable in the bastard. Up to the present, however, there is only one such irregular bastard known, namely, *C. Ledgeriana*, which contains from 5 to $13\frac{1}{2}$ per cent. of quinia, the latter percentage corresponding to 17.83 per cent. of sulphate of quinia, and being the largest percentage so far observed in any bark. Unfortunately this species of cinchona is generally sterile, while all other cinchona hybrids are exceedingly fertile. This second fact, which thus would appear to rest only upon a single observation, has been indirectly proven by the author, as he has succeeded, by its aid, to correctly classify the various forms of *C. Ledgeriana*, according to their percentage of quinia, without having previously known the results of the analysis. This knowledge is important, as it enables the multiplication of this valuable but generally seedless species by the artificial production of irregular hybrids. Under

Regular Hybrids the author understands those which are directly produced from two original species. As these are generally sterile, excepting in the case of cinchona, but are often fecundated by the parents, there are thus produced *recent* (meaning "not far removed from the parents") regular bastards, which are themselves fertile and occur in a wild state. In the case of cinchona, however, even the primary bastard is fertile;

but, besides, we find also the so-called "recent" forms, because legitimate fecundation is rather the exception in this family.

Irregular Hybrids are those which are produced by the fecundation of an original species through the pollen of a hybrid. While in regular bastards the characters of the parents are mixed and blended together, in irregular bastards they are found irregularly distributed but mostly individually preserved. The miscegenation of species in the Asiatic plantations is enormous, especially in Mungpo, where the copses of the different species are in close proximity, and where the seeds are not collected from selected trees, but from whole fields.—New Rem., February, 1879, pp. 44–46; from Drog.-Zeit.

Bolivian Cinchonas—Analyses.—Professor W. Stoeder communicates the results of the analyses of 27 samples of Bolivian cinchona barks, being the collection of E. Schuhkraft, Consul for the Netherlands to Bolivia, exhibited at Amsterdam in 1877, on the occasion of the International Horticultural Exhibition. The collection was, perhaps, the most complete ever exhibited, embracing all known varieties of Bolivian barks, from the remarkable "monopol-cinchona," the parent plant of which has long been exterminated, to the perfectly worthless barks which are used by the "Cascarilleros" for admixture with the valuable barks. The efforts of Schuhkraft are important also, since it has been possible, for the first time, to subject Calisaya barks, the origin of which is positively known, to chemical analyses. All analyses of Calisaya barks that have hitherto been made have only a comparative value, since the commercial Calisaya barks are, as a rule, admixtures of barks, the source and origin of which cannot be determined with certainty. The barks examined are concisely enumerated and described as follows:

1 and 2. *Flat Calisaya Bark (Quinquinas Calisaya Plats).*—These samples represent the former monopol-cinchona as it formerly was found in commerce before the extermination of the trees. At present this bark is no longer to be had. The exhibited samples are remarkably handsome, very rich in alkaloids, and are perhaps the last remains of the monopol-period (1845–1855).

3 and 4. *Flat Calisaya Bark (Quinquinas Calisaya Plats).*—Derived from trees which were discovered in the province of Yungas after 1874–'75; very rare, and very rich in alkaloids (Schuhkraft).

5 and 6. *Flat Calisaya Bark with the Epidermis (Quinquinas Calisaya plats à épiderme).*—Derived from the province of Yungas,

provided with the outer bark; in all probability rich in alkaloids (Schuhkraft).

7. *Flat Calisaya Bark (Quinquinas Calisaya Plats)*.—Derived from trees in the province of Inquisivi. Numerous groups of this tree, which formerly was not felled on account of the deficiency of the bark in alkaloids, are still found in the department of Cochabamba; but they are now gradually being used up and, it is feared, will soon be exterminated. The exhibited samples were selected, and were supposed to contain 1 to 2 per cent. of alkaloids. As will be seen by the table, however, they contain a much higher percentage, 4.336 per cent., and contained more quinia (3.292 per cent.) than did the monopol-bark.

8. *Flat Cinchona Bark (Quinquinas Plats)*.—The bark is derived from trees which have very recently been discovered at Espiritu Santo, in the province of Yurucares, and which probably contain no quinia (Schuhkraft). This opinion of Schuhkraft proved on analysis to be correct (see table).

9 and 10. *Flat Cinchona Bark*.—The bark of trees in the province of Larecuja and the neighborhood of Songo and Challaux, known in Bolivia under the name of *Cascarilla Naranjada* (orange-colored cinchona); said to contain no quinia, but to be rich in cinchonina (Schuhkraft).

11. *Cinchona-quill Bark (Quinquinas Roulés)*.—The branch bark of the "Naranjada trees" of Songo and Challaux (9 and 10), worthless, and fraudulently mixed with quill Calisaya bark (Schuhkraft).

12 and 13. *Calisaya quill Bark (Quinquinas Calisaya Roulés)*.—Very rich barks derived from Calisaya trees, and probably from young stems, branches, and shoots from old roots, probably containing 4 per cent. of quinia (Schuhkraft); they become more rare every year, and will probably be soon exterminated.

14 to 18. *Cinchona-quill Bark (Quinquinas Roulés)*.—The bark of young stems and shoots, from the province of Caupolican and the districts of Pelechuco and Apolobamba; very deficient in alkaloid (Schuhkraft).

19 to 23. *Cinchona-quill Bark (Quinquinas Roulés)*.—The branch barks of the trees described under 7; worthless for commercial purposes, but gathered for fraudulent admixture with better kinds.

24 and 25. *Cinchona-quill Bark (Quinquinas Roulés)*.—The branch barks of trees of the province of Yungas and the district of

Choromba; this variety contains almost 0.5 per cent. of quinia, is called *Quina Verde* by the natives, and largely sold for good "roulés," with which it has some resemblance (Schuhkraft).

26. *Flat and Quilled Cinchona Bark*.—Recently imported from Cochabamba, and obtained from trees in the province of Vallegrande, about 50 leagues west of Santa Cruz; probably contains no quinia (Schuhkraft).

27. *False Cinchona Bark (Faux Bois)*.—The bark of a tree called by the Aymara Indians "Car-hua-Car-hua," which is frequently used for admixture with good barks. The present sample, however, appeared to be a mixture of barks, of which the greater part did not have the appearance of cinchona bark, while some had the appearance of genuine but young cinchona barks. The analysis also speaks for the presence of the latter.

The following table gives the results of the analyses which were made by methods that need no nearer description here:

Sample of bark. No.	Quinia. Per cent.	Quinidia. Per cent.	Cinchon- idia. Per cent.	Cinchonia. Per cent.	Amorphous alkaloids. Per cent.	Total alkaloids. Per cent.
1 and 2	3.110			0.490	0.195	3.795
3 and 4	4.268			0.496	0.164	4.928
5 and 6	1.724			0.468	0.172	2.364
7	3.292			0.772	0.272	4.336
8				1.288	0.236	1.524
9 and 10			1.516	2.096	1.088	4.700
11				2.044	0.632	2.676
12 and 13	3.892			0.564	0.144	4.600
14 to 18				0.234	0.036	0.270
19 to 23	0.293			0.055	0.184	0.531
24 and 25				1.184	0.652	1.836
26				2.128	0.408	2.536
27	0.308		0.512	0.760	0.088	1.668

—Arch. f. Pharm., September, 1878, p. 243-252.

Cinchona.—*Assay by means of Permanganate of Potassium*.—Mr. John Baker Smith has communicated an original method of estimating the alkaloid in cinchona bark, which consists in making a suitable extraction with alcohol, hot or cold water, etc., titrating a portion of this with permanganate solution, then precipitating the alkaloids by means of lime from a like quantity of the extraction, titrating this as before, and ascertaining the difference, which will correspond to the total alkaloid contained in the samples. The method can be available only if the lime precipitates nothing of an oxidizable nature besides the alkaloids; but experiments in this direction do not seem to have been made.—Yearbook of Ph., 1878, p. 550.

Cinchona—Comparative Strength of Various Preparations made from the same Bark.—Mr. Charles Ekin has determined the alkalioid in a sample of cinchona bark, and in the preparations made from it, by the following method: 250 grains of the apparently good sample of Calisaya bark, in fine powder, were mixed with milk of lime,—made of 100 grains of dry slaked lime and 600 grains of water,—the mixture dried thoroughly at a low temperature (in the sun), and treated with 6000 grains of alcohol in successive portions, after Dr. De Vrij's method. The alcoholic solution was slightly acidulated with sulphuric acid, and the filter well washed. The greater part of the spirit was recovered by distillation, and the residue poured into a capsule, to which were added the spirit and water, with which the retort was subsequently washed. The capsule was heated on a water-bath till the spirit was expelled, and the remaining liquor after cooling was filtered, and the filter and its contents washed repeatedly with water slightly acidulated with sulphuric acid until caustic soda ceased to produce any turbidity in the passing liquid. The liquid was reduced in bulk on the water-bath, transferred to a stoppered bottle, into which the washings from the capsule were also placed, rendered alkaline with ammonia, and agitated with sufficient chloroform in three successive portions. The chloroform solution was separated by a funnel, and evaporated on a water-bath until it ceased to lose weight; the dry residue being taken to represent the total alkaloids of the bark. This process, suitably modified, was used in determining the amount of alkaloids contained: 1, in a tincture made with proof spirit; 2, in an infusion; 3, in a decoction; 4, in a fluid extract; 5, in Battley's liquor cinch. cord.

The results were as follows:

100 grains of Calisaya bark yielded . . .	1.96	grains total alkaloids.
500 min. of tincture (= 100 grains bark), . . .	1.89	" " "
2000 min. of infusion (= 100 grains bark), . . .	1.81	" " "
1600 min. of decoction (= 100 grains bark), . . .	1.26	" " "
25 min. of fluid extract (= 100 grains bark), . . .	.47	" " "
18 min. of Battley's liq. cinch. cord. (= 100 grains bark), . . .	.46	" " "

The proof spirit tincture therefore nearly exhausts the bark. Boiling water, as in the case of the decoction and infusion, takes up about five-eighths of the alkaloids; and cold water, as in the case of the fluid extract, takes up, or at all events retains, about one-fourth. Battley's liq. cinch. cord., claimed to represent the

finest bark in the proportion of one ounce in the fluid drachm, evidently does not come up to the standard claimed.—Yearbook of Pharm., 1878, p. 547.

CAPRIFOLIACEÆ.

Sambucus Glauca (White Elderberry), *S. Racemosa* (Red Elderberry).—The fruit of both these species is eaten by the Indians of California. In Southern California the red species is preferred, being more fleshy and juicy than the white.—Dr. E. Palmer, A. J. Ph., November, 1878.

UMBELLIFERÆ.

Apium Graveolens, Linn.—*The Fruit. Vernacular: Karafs, Boree-Ajmud* (Arab., Hind., Bomb.).—Wild celery does not appear to have been known to the ancient Hindoos. The Arabians probably obtained their knowledge of it from the Greeks. Meer Muhammed Husain, who wrote in India about one hundred years ago, says that karafs is the celery of the Europeans, and the oodasaliyun of the Greeks. He describes three other kinds, viz.: *Sakhree*, in Greek Fiturasáliyun; *Natti*, in Greek Akoosaliyun; and *Tari*, in Greek Shamareeniyun; but it is difficult to decide what all these may be. Fiturasáliyun is now the bazaar name in Bombay for the fruits of *Prangos pabularia*, but it is evidently a corruption of the Greek *Petroselinon*, and had once a different meaning, being described in Arabic works as like Ajowan. The fruits imported into Bombay from Persia under the name of karafs, and sold in the bazaars as boree-ajmud, agree in structure with those of *A. graveolens*, L. It is a very small fruit, which, when the two mericarps are united, as is often the case, is almost globular; it is quite smooth, and remarkable for the size and prominence of its ridges; the vittæ are 11–12 in number; two of these are on the commissural side. The taste of the drug is at first like anise, but afterwards bitter. The odor like anise, but faint. Mohammedan writers describe karafs as deobstruent and resolvent, and use it in the form of poultices with barley-meal; they recommend it internally as a pectoral and as a tonic and carminative adjunct to purgatives; also as a diuretic, emmenagogue, lithontriptic, and alexipharmic.—Professor W. Dymock, in Ph. J. Trans., June 14th, 1879, p. 1016.

Carum Gairdneri.—The tuberous roots of this plant are much

eaten by the Indians of the Pacific Coast, either raw or boiled with other substances. When raw the root has a nutty taste, but when cooked assumes a carrotty flavor. Its outer surface is grayish, but its interior is white and farinaceous. The roots of *Onoclea occidentalis* (?) are also a favorite food of these Indians. The roots are about the size of carrots, are sweet and well-flavored, but require a long preparation to fit them for use.—Dr. E. Palmer, A. J. Ph., November, 1878.

Ligusticum Apiifolium, the *Angelica* of the settlers of Utah, is called *Pahnet-snap* by the Pah-Utes, with whom it is a favorite medicine. The root is bruised and used as a poultice for sprains and bruises. A tea is made from the roots, and is taken internally for pain in the stomach. It also has a reputation among these Indians as a prophylactic, probably on account of the strong aromatic, carrotty smell; those afraid of contagious diseases filling their nostrils with pieces of the root.—Dr. E. Palmer, A. J. Ph., December, 1878.

Ferula Galbaniflua, Boiss.—*The Gum-Resin*. Vernacular: *Jawashir*, *Gaoshir*, *Bireez* (Pers.).—Besides this plant, Boissier states that another species, *F. rubricaulis*, grows in Persia. Borszczow, however, regards it only as a variety of *F. galbaniflua*. He states, though not from personal observation, that its gum-resin, which constitutes Persian galbanum, is collected for commercial purposes round Hamadan. Persian brokers in Bombay state that the galbanum plant is very abundant between Shiraz and Kirman, and there would seem to be no reason to doubt that the Bombay market is supplied from that district. The stems, fruits, and flowers, which often come mixed with the drug, apparently answer to the description of either plant. The old Hindoo writers make no mention of galbanum. Ainslie found that the Tamil physicians were unacquainted with it, and the notices of galbanum in many Mohammedan works appear to have been copied from Greek writers.

In Bombay Persian galbanum is known as *jawashir*, which appears to be an Arabic corruption of the Persian *gaoshir*. Native practitioners of India may be said not to know the drug; the bulk of what is imported into Bombay being sent to Egypt and Turkey as *jawashir*. It is a yellow or greenish-yellow fluid, of the consistence of thick honey, and having an odor between that of Levant galbanum and sagapenum. It generally arrives

mixed with portions of the stems, flowers, and fruit of the plant; the root is rarely to be met with. Professor Dymock has never seen the gum-resin quite dry, but in some samples the consistence has been sufficient to enable him to trace the outline of tears in the sticky mass.—Professor W. Dymock, in Ph. J. Trans., June 14th, 1878, p. 1017.

Pastinaca Grandis, Dalz. and Gibs.—*The Fruit. Vernacular: Baphullec (Bomb.), Dookoo (Hind.)*.—The description of dookoo in Arabic and Persian works shows it to be a kind of wild carrot, with small fruit and a finely-divided leaf. The name itself is evidently a corruption of *daucus*. It has been described as resembling the fruit of *asafoetida*, and as being probably derived from some species of *Ferula*; but Dr. S. Argun, of Bombay, planted some of the fruit and this has now produced a flowering stem, and proves to be the *Pastinaca grandis* of Dalzell and Gibson. The fruit is carminative and stimulant, and is said to be diuretic. It has a powerful lemon-odor. By distillation a light-yellow essential oil was obtained with an odor like oil of orange-leaf.—Professor W. Dymock, in Ph. J. Trans., June 14th, 1879, p. 1016.

ARALIACEÆ.

Aralia Papyrifera, Hooker (*Rice paper Plant*).—Dr. F. V. Greene draws attention to this interesting plant, the pith of the stem of which forms, when cut, the article known as rice-paper. The plant grows in the swampy forests of the Island of Formosa, and apparently there only, forming a small tree, branching in the upper part, the younger portions of the stem, together with the leaves, covered with copious yellow down. The full-grown leaves are sometimes a foot long, cordate, five or seven lobed, of a soft and flaccid texture. The panicles of flowers come from the extremities of the stem and branches, rising above them, and then becoming pendulous, one to three feet long, bearing numerous capitate umbels of small greenish flowers.

Sir W. J. Hooker has recorded his investigations in regard to this plant in his "Journal of Botany," in the volumes for 1850, 1852, 1853, and 1855. The volume for 1852 contains a plate giving, among representations of other parts of the plant, those of root and stem, with the cylinders of pith entire, and cut vertically to exhibit the septa. These are reproduced, reduced to one-half the original size, in Fig. 37, on the opposite page,

Dr. Hooker giving the following description: "The root is thick and fusiform, slightly divided, equally woody with the stem. Our representation of that is taken from the lower part of a dead plant, cut through transversely and vertically. Our larger stem exhibits the same characters. A section exhibits a moderately thick bark, a thicker circle of pale wood; within, the tube is occupied by the white pith descending to the root. In the thicker

FIG. 37.

Aralia papyrifera.

stems the pith readily separates from the wood, with a rather rusty-colored furrowed coat, which seems to take this character from so many ridges on the inside of the wood. Among our numerous samples of the pith, freed from the external coating, and cut into perfect cylinders, some are uniform or solid, while others are furnished with cavities, divided into compartments by entire or more or less ragged septa. The comparatively high cost of the large sheets proves that the pith does not in general attain a great diameter. The largest specimens of the pith sent to the Kew Museum measured twenty-six inches in length, and the thickest was rather more than six inches in girth."

Specimens of the pith, which Dr. Greene procured in Formosa,

in 1868, correspond well with the description and cuts from Hooker's "Journal."—A. J. Ph., May, 1879, p. 241.

RANUNCULACEÆ.

Hydrastis Canadensis.—*Proximate Analysis*.—Herman Lerchen has subjected the rhizome of hydrastis to comprehensive proximate analysis. By cold water he extracted *albumen, sugar, extractive matter*, and *an acid*, which, though producing a dingy greenish color with ferric chloride, produced no precipitate with sulphate of quinia or gelatin, and was therefore not tannic acid. By boiling ether he extracted a *fatty resinous mass*, slightly colored, nearly tasteless, insoluble in water. Alcohol dissolved, besides the alkaloids, a *brown resin*, having a soaplike and bitter taste, leaving an acrid impression. By distillation with water, a minute quantity of *volatile oil*, having the heavy odor of the infusion, was obtained. Boiling water extracted *starch*. The ash, amounting to 10 per cent., contained silica, and carbonates, sulphates and chlorides of potassium, sodium, magnesium, calcium, and iron.

The alkaloids *berberina* and *hydrastia*, as well as the unnamed third alkaloid, first described by A. K. Hale (see Proceedings, 1873, p. 232), and subsequently, more fully, by J. C. Burt (see Proceedings, 1876, p. 156), were separated and identified by the author, who proposes for the latter alkaloid the name of *Xanthopuccina*, from its yellow color and the common name of hydrastis, yellow puccoon. Mr. Lerchen finds that the crystallized orange-yellow alkaloid dissolves in strong hydrochloric or nitric acid without change of color, in sulphuric acid with a light-yellow color. Its taste is acrid and bitter. It dissolves in hot water and alcohol, but is insoluble in ether and chloroform, either cold or hot.—A. J. Ph., October, 1878, p. 470.

Pæonia Peregrina.—The seeds and the roots of this plant have been subjected to comprehensive chemical examination by Professor Dragendorff and Professor K. Mandelin, with the assistance of Messrs. Stahre and Johansson. The seeds, according to the analysis of Dragendorff and Stahre, are composed as follows:

Moisture, 8.45 per cent.; ash, 2.57 per cent. (phosphoric acid, 0.815 per cent.); fixed oil, 23.61 per cent.; pæonia resinous acid with small quantities of indifferent pæonia-resin, 1.13 per cent.; tannic acid (less than 1 per cent.), pæonia-fluorescin (about 4 per cent.), pæonia-brown (about 4 per cent.), = 8.71 per cent.; legu-

min with a little albumen and mucilage, 5.44 per cent.; other albuminous substances, alkaloid, etc. (nitrogen, 1.75 per cent.) 5.50 per cent.; sugar, 1.40 per cent.; substances soluble in water and diluted alcohol, insoluble in absolute alcohol, 7.68 per cent.; arabic acid, 1.22 per cent.; cellulose, 11.73 per cent.; other components of the cellular tissues, etc., 22.56 per cent.

Two samples of the root (No. 1, peeled; No. 2, unpeeled), were subjected to analysis by Professor K. Mandelin and Mr. Johansson. The results are as follows:

	100 parts of the Root.	No. 1.	No. 2.
1. Moisture,	15.69	16.19
2. Ash,	5.39	4.10
3. Fat,	0.74	0.47
4. Resin,	0.25	0.27
5. Chromogene, sugar, etc., soluble in alcohol,		0.17	4.14
6. Glucose,	4.45	4.84
7. Tannin-like substance in aqueous extract,	0.41	0.97
8. Vegetable acids,	1.11	1.01
9. Tannin in alcoholic solution,	0.04	0.47
10. Substances soluble in water and in alcohol, accompanying the tannin,	2.85	0.68
11. Saccharose (?),	14.08	8.87
12. Other substances, soluble in water, not pre- cipitable by alcohol, about	5.12	0.93
13. Metarabic acid,	2.01	0.71
14. Other substances soluble in soda-lye,	5.09	—
15. Amylon,	14.86	25.65
16. Carbohydrate, insoluble in water, sacchari- fiable by HCl, but not by diastase,	2.22	5.84
17. Oxalic acid, united to lime,	0.40	0.56
18. Pararabin-like substance,	0.81	1.19
19. Albuminoid and other nitrogenous sub- stances,	3.98	9.69
20. Cellulose,	5.51	8.89
21. Lignin, etc.,	3.29	—
22. Substance of the middle-lamella, etc.,	3.34	4.88
23. Other substances of the cellular tissues, etc.,		8.19	—

The differences in these two analyses are explained by the fact that No. 1 constituted the perfectly developed fall root, from which the bark, rich in starch, had been removed; while No. 2 was the young, not perfectly developed summer root.

Professor Dragondorff, furthermore, observes that there exists in the seeds a peculiar crystalline body, which has been provis-

ionally named *pæonia-crystalline*. This substance, it appears probable, is changed during the maturation of the seeds into indifferent *pæonia-resin* and into acid *pæonia-resin*. The author hopes to collect a sufficient quantity of the seeds during the summer, and will continue his investigations.—Arch. d. Ph., May (pp. 412–438) and June (pp. 531–553), 1879.

Pæonia Moutan.—Mr. Jagi, a student in the Pharmaceutical Laboratory of Tokio, Japan, has subjected the root of this plant, which is frequently used by Japanese physicians, to chemical examination. By treating the coarsely-powdered root with ether, and allowing the ethereal tincture to evaporate spontaneously, a crystalline mass is obtained, which, when purified by suitable means, furnishes snow-white, glistening needles, having an aromatic odor when heated, melting at 45°C. ($= 113^{\circ}\text{F.}$), and subliming completely at a higher temperature. It is insoluble in water, cold or hot, but readily dissolved by alcohol or ether. The elementary composition, as well as its chemical reactions, render it probable that the new body is closely related to caprinic acid.—Arch. f. Ph., October, 1878, p. 335.

Aconitum Heterophyllum (Wall.).—Several years ago the attention of European physicians residing in India was drawn to the root of this plant, which, under the names “Utees, Atees, or Atis” was employed, on account of its antiperiodic properties, in the treatment of fevers. It is said to have no poisonous properties and to be, indeed, a valuable antiperiodic; being given in ordinary cases of intermittent fever, in form of powder, 20 grains to the dose, and as a simple tonic in doses of 5 to 10 grains, three times a day. The root has not been subjected to complete chemical examination, but Broughton, in 1874, succeeded in isolating from it a peculiar non-poisonous alkaloid, which he named “Atesin,” and to which he gave the empirical formula, $\text{C}_{46}\text{H}_{74}\text{N}_2\text{O}_4$. In the latter part of the same year Mr. F. B. Groves (see Proceedings, 1874, p. 425) obtained from German *Aconitum Napellus* roots a simply bitter, non-poisonous alkaloid, which he believed to be identical with Broughton’s atesin. The late Mr. Daniel Hanbury, however, doubted the identity of the two substances, and Mr. C. R. Alder Wright (see Proceedings, 1875, p. 355) subsequently obtained numbers for Groves’s preparation, which correspond to the formula $\text{C}_{31}\text{H}_{45}\text{NO}_{10}$, and which do not agree with those obtained by Broughton for his atesin.

Dr. M. Dunin v. Wasowicz has now undertaken a more thor-

ough examination of the root of *Aconitum heterophyllum*, a quantity (5 kilos) having been submitted to him by Professor Flückiger for this purpose. After a description of the plant, and particularly of the root and its microscopic character, which is accompanied by numerous illustrations taken from Royle's "Illustrations of the Himalayan Botany," tab. xiii, the author gives the details of his examination, the results of which are briefly given in the following:

The root of *A. heterophyllum* (Wall.), contains:

1. A soft fat, probably composed of olein, palmitin, and stearin.
2. Aconitic acid.
3. An acid resembling ordinary tannic acid.
4. Cane sugar.
5. Vegetable mucilage.
6. Pectin bodies.
7. The alkaloid—atesin—of Broughton, and in all probability a second alkaloid, which is also amorphous.
8. Starch, determined microchemically.

The ash, amounting to 2.331 per cent. of the perfectly dried root, contains Al, Mg, Fe, K, and Ca, united to HCl, H_3PO_4 , H_2SO_4 , and H_2SiO_3 . The alkaloid,

Atesin, when perfectly pure, constituted a white, amorphous, pulverizable mass, which corresponded in its composition very closely with the formula given by Broughton ($=C_{46}H_{74}N_2O_4$). When exposed to the light for some time it becomes yellow to yellowish-brown and resinous. It is very sparingly dissolved by water, somewhat more by diluted alcohol, and readily and completely by absolute alcohol, ether, benzol, etc. Its solutions have a pure bitter taste without the slightest acidity. The alcoholic solution affords a precipitate with water, and the mixture froths strongly, like saponin, on agitation. Alkalies do not produce color reaction with the substance. Pure concentrated sulphuric acid produces a faint violet color, which changes to red and then dark red, and after about an hour becomes dirty brown. Sulphuric acid and bichromate of potassium produce a green color, with a distinct red-violet zone; nitric acid occasions a brown color only.

Of the salts of atesin, the nitrate, sulphate, and acetate were obtained in the amorphous state only, but are readily dissolved by water. The hydrochlorate, hydrobromate, and hydriodate,

on the contrary, are sparingly soluble in water, but are obtained in a very handsome crystalline condition. Of these the hydriodate is easiest obtained in a pure condition. It is composed, as are the hydrochlorate and hydrobromate, of 1 molecule acid, 1 molecule alkaloid, and 1 molecule water of crystallization. The mother liquors from the hydriodate, though still containing considerable quantities of alkaloid, were found incapable of yielding a further quantity of crystals, from which the author concludes that there exists, probably, a second alkaloid. The limited quantity of material prevented further experiments in this direction. The non-poisonous character of atesin is fully confirmed by the author's experiments. The small quantity of alkaloid contained in the root prevented further physiological experiments.

In connection with the above Mr. V. Wasowicz gives a description of

Japanese Aconite Root, being a portion of the same lot examined by B. H. Paul and C. T. Kingzett in 1877 (see Proceedings, 1878, p. 599), and described by the late Mr. D. Hanbury in "Science Papers," etc., 1876. An alcoholic extract of the root proved to be much more powerful as a tonic than corresponding quantities of the extract of *A. napellus* root, and it approaches very closely in action to that of *A. ferox*.—Arch. J. Ph., March, 1879, pp. 193–225.

Japanese Aconite is gradually finding its way into English retail commerce. Specimens received from Exeter, in January, 1879, were stated to have been sent out from a wholesale firm as ordinary *rad. aconiti*. It is necessary, therefore, to warn pharmacists that since its relative strength has not been determined, nor even the identity of its alkaloids with those of *Aconitum napellus*, it will not be safe to make any preparations for internal use from it. It appears to be even stronger than *A. napellus*. It is easily recognized by its plump, scarcely shrivelled appearance, and white, very starchy fracture. So far as can be learned at present the plant yielding it is the *A. Fischeri*, a plant fairly distinct from *A. napellus*.—N. Rem., May, 1879, p. 146; from Pharm. Journ. Trans., January 25th, 1879.

Cimicifuga Racemosa (Ell.)—*Proximate Examination*.—Mr. Frank H. Trimble has communicated a series of researches made with black snakeroot. Tannin was found to be absent. He

obtained instead an amorphous substance which gave, with ferric chloride, a dark-green color, similar to that produced by quercitrin, and was not a glucoside. A portion of the same aqueous liquid which had yielded this amorphous substance as a lead precipitate, yielded a white precipitate with gelatin, but the washed precipitate was not colored black or dark green by ferric chloride.

The resin of *cimicifuga*, obtained by precipitating the concentrated tincture of the root with water, was treated for the crystalline principle of T. E. Conard (A. J. Ph., 1871, p. 152). The author obtained an amorphous, yellow resinous mass, which had the behavior described by Conard, but differed in being amorphous. No indications of volatile oil or alkaloid were obtained. The crude resin of *cimicifuga* (obtained by precipitating the concentrated tincture with water) yielded to petroleum benzin a fatty matter, which, in its turn, yielded to alcôhol a yellow acid matter, partially soluble in water, soluble in ether and chloroform, and giving with ferric chloride a yellow solution, having an agreeable odor resembling pineapple, and which was completely dissipated by heat. The portion of the crude resin which was precipitated from its alcoholic solution by acetate of lead yielded an acid substance, which when evaporated from its alcoholic solution spontaneously over sulphuric acid formed greenish prisms. They were deliquescent, acid to the taste, soluble in ether, alcohol, and water, fusible, and yielded a white precipitate with ferric chloride.—A. J. Ph., October, 1878, p. 468.

BERBERIDACEÆ.

Berberis—*Species of the Pacific Coast*.—Professor J. M. Maisch contributes an interesting review of the genus *Berberis*, and particularly of the species indigenous to the North American territories bordering on the Pacific. At present there are known about 50 species of *Berberis*, the largest number belonging to South America. In the eastern section of the United States there is but one indigenous species.

Berberis Canadensis, Pursh.—A shrub but 1 to 3 feet high, growing in the Alleghanies of Virginia and southward, and having repandly-toothed leaves and few flowered racemes; it is, according to Gray, not indigenous to Canada.

Berberis Vulgaris.—Indigenous to Europe, has been naturalized

in New England, and grows spontaneously in other parts of the United States.

A large number of species are found in the Western United States, in the territory bordering on the Pacific. These are all so different from the above species that they were arranged by Nuttall into the separate genus, *Mahonia*, which was also adopted by De Candolle, but has more recently been regarded merely a sub-genus of *Berberis*. From this it is distinguished by evergreen oddly-pinnate leaves, with sessile spinulously-toothed leaflets, by the absence of glandular spots at the base of the petals, and by the presence of a tooth on each side of the apex of the filament. Instead of the bright-red, or scarlet oblong, or oval berries of the above species, the species of the Pacific Coast have globular, dark-blue berries, on which account they seem to be indiscriminately called *Oregon grape*. All of the species resemble each other so closely that it is difficult for others than botanists to distinguish between them; and as it appears also that these plants have been used indiscriminately on the Pacific Coast for many years, it is not unlikely that they are indiscriminately collected and used as *Berberis aquifolium*. The botanical descriptions of the California species are given by Professor Maisch as follows:

Berberis Repens, Lindl.—A low, somewhat procumbent shrub, less than a foot high, leaflets 3 to 7, ovate, acute, not acuminate, 1 to 2½ inches long, not shiny above; racemes few, terminating the stems, 1 to 1½ inches long. *B. Aquifolium*, Pursh, mainly, and of numerous authors. Throughout California, and extending northward to British Columbia, and eastward to Colorado and New Mexico.

B. Aquifolium, Pursh.—A shrub 2 to 6 feet high, leaflets usually 7, but often more; the lower pair distant from the stem, ovate to oblong lanceolate, 1½ to 4 inches long, acuminate, green and shining above, sinuately dentate with numerous spinose teeth; racemes 1½ to 2 inches long, clustered chiefly in the sub-terminal axils; fruit nearly globose. Frequent in Oregon and northward, where it is known as the "Oregon grape," and reported southward in the coast ranges even to Monterey. Pursh's description and figure belong mainly to *B. repens*.

B. Pinnata, Lag.—Very much like the last species, but the leaves more crowded and more nearly sessile, the lower pair of

leaflets being approximate to the base of the petiole; leaflets usually 5 to 7; racemes more frequently lateral upon the branches; fruit ovoid, 4 lines long. *Mahonia fascicularis*, D. C. Hills about San Francisco Bay, and eastward to San Diego, thence east to New Mexico.

The above species all have pinnate leaflets. It will be observed that Pursh included *B. repens* in his *B. aquifolium*, to which it is asserted the name "Oregon grape" is usually given; and Mr. Neppach, who has analyzed the rhizome of *B. nervosa*, states that this name is also given to this plant in Oregon.

B. Nervosa, Pursh.—Differs from all of the above in having palmately nerved leaflets. Stems simple, but a few inches high; petioles and peduncles springing from the apex, accompanied by dry, glumaceous, rigidly acuminate bracts; leaves 1 to 2 feet long, of 11 to 17 ovate acuminate leaflets; racemes elongated; pedicels short; fruit larger than in the preceding species, 3 to 4 lines in diameter. *Mahonia glumacea*, D. C. Near the coast, from Monterey to Vancouver Island.

Fig. 38 is a representation of *B. repens*, Lindl. Professor Maisch observes that the *pinnate* venation is well marked in the cut; that some leaflets of *B. nervosa* before him have, aside from their different shape, one or two veins on each side of the midrib, originating at the very base thereof; and that the leaflets of *B. aquifolium* differ from those figured in being narrowed towards the apex.—A. J. Ph., August, 1878, p. 374.

Berberis Nervosa, Pursh.—The rhizome of this plant is the part used medicinally, and has been analyzed by Mr. Peter Neppach, who also gives the following description: The rhizome is horizontal in the ground, very knotty and crooked, from the size of a quill to an inch in diameter, and has a very thin bark, of a dingy yellowish-brown color externally, somewhat lighter internally, and covering a white, tough wood. It is regarded as possessing tonic and febrifuge properties, and has been used in syphilitic complaints with asserted success. The author's analysis appears to prove the presence of the alkaloid *berberina*, and possibly another alkaloid.—Ibid., p. 373.

After his paper "On the Species of *Berberis* of the Pacific Coast" had been printed, Professor Maisch had occasion to examine Lindley's figure of *Berberis repens* (Botanical Register, plate 1176), and found it entirely different from that represented

FIG 38.

by Fig. 38. The leaves of the former are nearly orbicular in outline, and have the lowest pair of leaflets very near the base of the petiole. The leaflets of the present plate agree in many respects with Gray's description of *B. aquifolium*; they are, however, not in the least acuminate. He considers it very likely that the different species may vary to some extent in the character of their leaves.—Ibid., p. 414.

Berberis Aquifolium, or Oregon grape, is a favorite remedy with the California Indians, the root, in the form of decoction or steeped in liquor, being used as a remedy for general debility, or to create an appetite. It is considered equal to sarsaparilla in its medicinal virtues.—Dr. E. Palmer, A. J. Ph., December, 1878.

Podophyllum—*Protocatechuic acid not found to Pre-exist in the Rhizome*.—In his paper on the resin of podophyllum (Proceedings, 1877, pp. 420–433), read before the Association at Toronto, Mr. F. B. Power had drawn attention to the possible pre-existence of protocatechuic acid. He has since had opportunity to examine the lead precipitate* produced in the mother liquors obtained in the preparation of podophyllum-resin in the laboratory of Dr. Squibb, from 400 lbs. of powdered rhizome (part of a lot of 1000 lbs.), and arrives at the conclusion that protocatechuic acid can as yet only be obtained as a decomposition product, and that its pre-existence must still remain a subject for future observation and discovery. The existence of

A colorless alkaloid in the rhizome, originally noticed by Professor Mayer (A. J. Ph., March, 1863, p. 98), is regarded as improbable by Mr. Power, and his present investigation of the lead precipitate, of which it should be a component, if, as claimed by Professor Mayer, it is precipitable by salts of lead, have failed to indicate its presence. That the alkaloid

Berberina is absent, the author believes to have conclusively proven by his former investigations above referred to; and he quotes in further support of his results, the more recent observations of Dr. E. R. Squibb, who failed to obtain a reaction with Mayer's solution of mercurio-potassic iodide in a liter of filtered liquid remaining after the precipitation of the resin.

The author furthermore draws attention to the fact, not always

* 12 lbs. crystallized acetate of lead were required for complete precipitation; the washed and dried precipitate weighed about 10 ounces.

considered, that Mayer's reagent, as well as other reagents commonly employed for alkaloids, produces precipitates with other substances besides alkaloids, and he holds that while such reactions may be assumed as indicative of the presence of alkaloids, the presence of such can only be established by isolation and identification.—A. J. Ph., August, 1878, p. 369.

MENISPERMACEÆ.

False Pareira Brava.—Charles Morrison has subjected a drug, sent to this country from Brazil as true pareira brava, to chemical examination, and found it to contain two alkaloids, one of them bearing close resemblance, yet differing to some extent from berberina. The drug consisted of the woody stems of a menispermaceous plant, was covered with a gray bark, and the bright-yellow wood was formed of more or less eccentric layers of fibro-vascular tissue. It resembles neither the drug obtained from *Cissampelos pareira*—which it was represented to be—nor that from *Chondodendron tomentosum*. A nearer description of the "false pareira brava" is not given.—A. J. Ph., September, 1879, p. 430.

RUTACEÆ.

Larrea Mexicana (*Tah-sun-up of the Pah-Utes*).—This is one of the commonest plants of Southern California, Lower California, Arizona, and Southern Utah. A lotion made by steeping branches of this plant in water, and applied to sores of man or beasts, proves very efficacious, and a powder from the dry leaves is good for chronic sores. From the old wood exudes an abundance of a gum, which is softened and used by the Indians to cement their flint arrowheads into their shafts. The Apache Indians use the gum as a styptic. The settlers of Utah often use this plant in dyeing, as it produces a greenish-yellow color, and garments thus dyed have the curious property of emitting a very disagreeable resinous odor ever afterwards on being heated. In consequence of the peculiar odor of the fresh plant it is sometimes called "creasote wood."—Dr. E. Palmer, A. J. Ph., December, 1878.

Buchu—Amount of Ash and Soluble Matter in the Three Sorts.—Mr. Henry W. Jones has obtained the following results during an examination of samples of buchu intended for commercial purposes. The drug was successively treated with dry ether, alcohol, and water until exhausted. The resulting solutions were

evaporated to dryness on a water-bath, and the extracts so obtained dried in an air-bath at 240° F. until they ceased to lose weight. The ether extract when dried was quite free from the characteristic smell of buchu, the essential oil being completely driven off during the drying, and therefore not represented in the results. It has been shown, however, by Mr. P. W. Bedford (see Proceedings, 1863, p. 211), that the short-leaved varieties of buchu contain 1.21 per cent. of volatile oil on an average, while the long-leaved, *B. serratifolia*, gave only .66 per cent. In the case of the aqueous extract the amount of mineral matter present was deducted. The ash was remarkable for containing a large amount of manganese, and the aqueous extract for a large quantity of mucilaginous matter.

Ash and Soluble Matter in the Three Kinds of Buchu.

(Three different samples of each species.)

	PERCENTAGE RESULTS.			
	Ash.	Soluble in ether.	Soluble in alcohol.	Soluble in water,
<i>Barosma betulina</i>	4.69	4.62	12.11	13.91
" "	4.47	4.29	13.96	14.25
" "	4.40	3.85	8.79	17.91
<i>Barosma crenulata</i>	4.32	5.70	11.26	13.99
" "	4.01	5.86	15.73	20.72
" "	5.39	4.01	10.10	17.75
<i>Barosma serratifolia</i>	5.03	4.78	11.57	17.92
" "	5.55	4.31	9.87	17.05
" "	5.22	3.91	7.71	22.38

—Ph. J. Trans., February 15th, 1879, p. 673.

Evodia glauca.—The bark of this plant, which finds medicinal application in Japan, and is largely used as a dye, contains, according to Dr. G. Martin, of the Pharmaceutical Laboratory of Tokio, *berberina*, the nitrate of which he has prepared. The bark is light yellow with slightly green tinge, and is covered with a corky epidermis; it is friable, soft, easily removed in lamellæ, has a strong bitter taste, and becomes mucilaginous when chewed. —Arch. f. Ph., October, 1878, p. 337.

Ailanthus Glandulosa—Uses in Greece.—Professor X. Landerer observes that the "tree of heaven," as it is called, which in its home attains a height of 80 to 100 feet, is used in Greece as an ornamental roadside tree. On account of the disagreeable odor

given off during the period of flowering, he thinks it might more aptly be called the "stink tree." In this respect it resembles the stinking bean trefoil, *Anagyris foetida*. Many years ago the bark of ailanthus was praised as a remedy for tapeworm. The author's experiments have convinced him of its usefulness, at least in dogs, to whom he administered a saturated decoction of the fresh bark.—New Rem., October, 1878, p. 296.

TILIACEÆ.

Copal—Composition, Alteration by Fusion, and Preparation of Varnish.—H. Schwarz finds that when copal is successively exhausted with cold ether there remains undissolved about 66 per cent. of a gelatinous, swollen mass, which on that account he terms "Schwell-copal;" when this is melted it also becomes soluble in ether. The portion originally dissolved by ether, which the author has named "soluble copal," remains liquid at 100° C. (= 212° F.) owing to the presence of the ethereal oil, which may be expelled at 130° C. (= 266° F.). When the original copal is sufficiently melted it is rendered soluble in the usual solvents,—ether, benzin, bisulphide of carbon, carbolic acid, and particularly chloroform; it is also dissolved by hot linseed oil and turpentine. The author names this "pyro-copal," and finds that in all cases the melting of copal causes an increase in the percentage of carbon, and a decrease in oxygen and hydrogen. When a chloroform solution of pyro-copal is poured into absolute alcohol, a fine yellowish mass is separated, which is quite insoluble in alcohol. This is called "pyro-schwell-copal." The residue of evaporation of the alcoholic solution constitutes a hard brownish resin. It is called "pyro-soluble copal." The composition of these different copals, or components of the same, are found to correspond to the following empyric formulas:

Crude copal, $C_{19}H_{30}O_2$.
Schwell-copal, $C_{48}H_{76}O_4$.
Soluble copal, $C_{36}H_{56}O_4$.

Pyro-copal, $C_{19}H_{26}O$.
Pyro-schwell-copal, $C_{48}H_{74}O_3$.
Pyro-soluble copal, $C_{36}H_{54}O_3$.

Regarding the manufacture of copal varnish, the author finds the best to be prepared from East Indian or East African copal by dissolving the melted copal in linseed oil varnish (boiled linseed oil? Rep.) and turpentine. A brilliant varnish can be obtained by working up manganese borate and red lead with the

linseed oil, and then gently heating to decompose the oil. The author describes the apparatus employed to melt the copal, and the necessary precautions to follow in the melting operations. Galvanized iron melting-pots have been employed with advantage instead of copper, which frequently gives a reddish sediment to the melted copal. A good copal varnish can be made by melting 1.5 kilograms of copal for 20 minutes with frequent stirring, then adding 3.5 kilograms of linseed oil varnish, and 1.75 French oil of turpentine.—Ph. J. Trans., August 3d, 1878, p. 89; from J. Chem. Soc.-Berl. d. Ch. Ges.

TERNSTROMIACEÆ.

Camellia Japonica.—Mr. Katzujama, a student in the Pharmaceutical Laboratory of Tokio, Japan, has subjected the seeds of this plant to chemical examination. The peeled seeds were ground, subjected to expression to remove fixed oil, and the presscake was then extracted with alcohol; the alcoholic filtrates were subjected to the action of subacetate of lead, the sulphur-yellow precipitate washed, suspended in alcohol, and decomposed with sulphuretted hydrogen. The filtrates, on concentration, deposited a white substance showing traces of crystallinity, which on drying constituted a blue-white powder having a bitter taste, which has been named *Camellin*. Subjected to ultimate analysis it gave figures corresponding to the formula $C_{53}H_{84}O_{19}$ ($O = 16$). It appears to be a glucoside. It is also probable that the filtrate from the lead precipitate contains a second glucoside. Dr. G. Martin, who communicates the above, states that the seeds are believed to be poisonous by the Japanese, and that the expressed oil, which is a thick liquid or semi-solid, and has an acrid, unpleasant taste, was formerly used by Japanese warriors for oiling their swords.—Arch. J. Ph., October, 1878, p. 334.

GUTTIFERÆ.

Gamboge—Examination of the Resin and Gum.—Mr. David Costelo has determined the relative quantities of resin and gum in commercial varieties of gamboge, and has made some experiments upon the characters of these constituents. Specimens of pipe, lump, and powdered gamboge were found to be composed as follows:

	Resin.	Gum.	Impurities.	Total.
Lump,	67.6	27.4	3.8	98.8
Pipe,	79.8	19.45	0.15	98.9
Powder,	76.6	22.5	0.7	99.8

The loss in these experiments is probably attributable to the small quantity of water present.

Resin of Gamboge is bright reddish-brown, translucent, very brittle; its solution in alcohol or ether has an acid reaction to test-paper. It is soluble in ether, chloroform, bisulphide of carbon, solutions of ammonia and potassa, and partially soluble in petroleum benzin. Various salts of the resin (*gambogic acid*) were made by following the experiments of Johnston and Büchner, with slight modifications. Solutions of the *ammonia*, as well as of the *potassa salt*, form a gelatinous deposit on standing. The *dry ammonia salt* is insoluble in water, alcohol, and ether. The *sodium salt* deposits as a yellow precipitate when a solution of chloride of sodium is added to a solution of the ammonia salt. From the latter solution chloride of barium deposits the *gambogiate of barium* as a dark brick-red precipitate; the *calcium salt*, of a brownish-red color, is deposited on the addition of solution of chloride of calcium. Both the calcium and barium salts are soluble in alcohol and ether, as is also the *lead salt*. Salts of strontium, copper, iron, etc., are obtained in a similar manner. The silver salt requires particular manipulation.—A. J. Ph., April, 1879, p. 174.

AURANTIACEÆ.

Citrus Aurantium.—Mr. W. B. Rush communicates an interesting paper on the various members of the *Citrus* family which are cultivated and grow in sections of the United States. In Florida the orange, lemon, and lime grow wild, and are found in abundance. In Louisiana and Mississippi they are grown from the seed. The orange-seed are planted in early spring, or in hot-beds in January. When one year old they are transplanted in a nursery. At the age of two and a half years they are budded, *i. e.*, the seedlings are of the sour variety, and to produce sweet oranges fully matured buds are taken from bearing trees and inserted. This is done to render the tree more hardy, since the sweet seedlings are subject to a root disease, called heel, while the sour seedlings are not. The trees are transplanted at the age of four years into orchards; at the age of six flowers first appear, and at ten years the trees are called full-bearers. The time of flowering is from the beginning of February until the tenth of April; the petals remain on the flowers about two weeks, but the duration is dependent on circumstances. An ordinary tree will

yield from two to ten pounds of flowers—ordinarily about seven. As soon as the petals begin to fall a canvas is spread under the tree, and by brisk shaking the petals will fall, with some leaves, which are easily separated. The flowers are most fragrant early in the morning, and late in the day the odor is greatly diminished. Two or three plates, containing about two ounces of the flowers, will perfume a room for a week. The oil of the flowers has but a faint resemblance to the odor of the flowers, and the same is true of the orange-flower water usually sold. In the author's opinion Florida furnishes sufficient flowers and fruit for all the oil of neroli, orange-flower water, citric acid, fruit-juice, and oil of the rind used in America; and unless misfortune happens to the sweet orange plantations there will be fruit sufficient for the United States from November to May.

Several experiments made by the author with orange-flowers show that when placed in the direct sunlight they lose all their odor in the course of two days. In diffused daylight they retain it for at least three days; and in a dark humid atmosphere the odor is quite distinct after one week. Bruised, they lose their odor in one-half the time stated. He suggests that they may be best kept hermetically sealed.—A. J. Ph., February, 1879, p. 68.

VITACEÆ.

Vitis Arizona; *V. Californica*.—The Indians of California, Arizona, and Southern Utah consume large quantities of both species of grapes in the ripe state. They dry them also for winter use. The seeds of the ripe fruit are saved and ground fine, and eaten in that condition. They sometimes also grind up the dried grapes and cook them. The Pah-Utes at St. Thomas, Nevada, had several sacks of dried grapes for sale last spring.—Dr. E. Palmer, A. J. Ph., November, 1878.

Wine—Clarification and Preservation.—L. Weigert recommends kaolin and Spanish earth for clarifying wines. The finest particles of these silicates are decomposed by the acids of the wine, with precipitation of gelatinous silica, which carries down with it those substances which, when held in suspension, render wine turbid. The amount of free acid is diminished by the use of these materials, Spanish earth exerting a greater action in this respect than kaolin. Little or no change is produced in the color of wine by the use of these silicates; a somewhat milder taste is

imparted to the wine after clarification. Kaolin and similar silicates remove certain nitrogenous bodies from wine, and thus a wine clarified by their use may be kept for a considerable time exposed to air without undergoing fermentative changes. These silicates, therefore, may be said to act as preservative of wine. The presence of a very small quantity of free acid in a wine suffices to decompose portions of the kaolin added. If wines be very poor in alcohol, clarification by kaolin is not advisable. One per cent. of kaolin, calculated on the weight of the wine, is the maximum that should be employed under any circumstances, whilst from one-third to one-half less of Spanish earth is sufficient. Temperature has little influence on the process of clarification. From four to six weeks are required to render the wine perfectly clear.—Chem. Centralbl., 1878, pp. 702, 703, in J. Ch. Soc., March, 1879, p. 290.

Wines—Relation of Bitartrate of Potassium to Ash.—Dr. M. Buchner has continued his examinations upon the composition of wines with special reference to the bitartrate of potassium contained in them, believing this to be definite in its relation to the ash. The variable quantity of tartar contained in wines has already been sufficiently shown by Berthelot, and Florieu, Fauré, Boussingault, and Kissel. It fluctuates between 0.029 and 0.29 per cent., the latter quantity corresponding nearly completely with the quantity that can be held in solution at ordinary temperature. The solubilities of bitartrates of potassium in alcohol diluted to the various strengths of wines, and at different temperatures, have, however, not been sufficiently determined, and the author, therefore, made a series of experiments as follows:

Saturated solutions of bitartrate of potassium were mixed with the proper quantities of absolute alcohol, and the mixtures exposed for ten days to the temperatures indicated in the table. The bitartrate retained in solution was then titrated with one-tenth normal soda solution. The result was as follows:

		Bitartrate. Per cent.		Bitartrate. Per cent.		Bitartrate. Per cent.
7	per cent. alcohol, at 0°,	0.150;	at 6°,	0.225;	at 15°,	0.260.
8	" " " "	0.180;	"	0.206;	"	0.220.
9	" " " "	0.110;	"	0.187;	"	0.206.
10	" " " "	0.100;	"	0.162;	"	0.187.
20	" " " "	0.075;	"	0.092;	"	0.112.
30	" " " "	0.087;	"	0.056;	"	0.056.

These experiments prove that by great reduction of temperature the wine may lose nearly one-half of its bitartrate of potassium. Only a very small percentage is again dissolved by the return to the ordinary temperature. The removal of so large a proportion of an important constituent of the wine must materially affect its taste.

The examination of a series of wines in the usual manner, for their alcohol, extract, free acids, bitartrate, and ash, did not give the expected relation between bitartrate of potassium and the ash, except in the case of some Southern wines.—Ph. Centralh., September 5th, 1878, p. 337.

Red Wine—Recognition of Foreign Coloring Matter.—A. Dupré has found that the coloring matter of red wine will not dialyze through parchment-paper, while many of those used to impart color to wines will readily permeate the membrane. The process is, however, inconvenient, for which reason the author recommends that a small cube of jelly (prepared by dissolving 5 grams of gelatin in 100 cc. of warm water and allowing to cool) be placed in the wine. After 24 to 48 hours the jelly is removed, washed, and laid upon a glass plate or a piece of white paper. If the coloring matter is that natural to wine, the surface of the cube only will be colored; but if it is artificial—fuchsin, cochineal, Campeachy wood, indigo, red cabbage, or malva flowers—they permeate the entire jelly. Fuchsin, red beets, and red cabbage produce a handsome red; Campeachy wood a yellow-brown; indigo a blue, etc.—Ph. Centralh., September 12th, 1878, p. 348.

Red Wines—Detection of Artificial Coloring Matters.—Nessler employs a reagent made by dissolving 7 p. alum and 10 p. acetate of sodium in 100 p. of water. This does not change the natural color of the wine, while that colored with malva flowers is changed to blue, that with huckleberries to bluish-violet, and that colored with cherries is changed to blue or violet. Certain Tyrolese wines, however, are, in the beginning, changed like that colored with malva flowers; but on standing the original color is restored, while the wine colored with malva becomes even of a deeper blue under the same conditions. The reactions named apply on the one hand to pure red wine, on the other to such as are altogether artificially colored. If the color of natural red wines is simply deepened by one or the other substance, the reaction becomes more or less unreliable.—Ph. Centralh., August 8th, 1878, p. 297.

POLYGALACEÆ.

Senega.—*Microscopic Characters*.—Mr. Thomas Greenish has examined a parcel of senega-root, the peculiar character of which had led to doubt as to its being senega-root at all. The roots were thinner, of a lighter color, and had fewer rootlets than the senega usually met with in commerce. Also the dark concentric rings were not present, and there was an absence of keel, with other characters of less importance. A decoction of it as compared with one from an ordinary sample, was much lighter in color, and in taste much less pungent. Nevertheless, the histological examination proved it to be a true root of *Polygala senega*. A transverse section of it is represented (in Fig. 39) by No. 1;

FIG. 39.

1

2



Sections of Senega.

No. 2 is a section of a root of a senega of commerce taken across a keel, and showing the general structure to be similar to the preceding; No. 3 is a section of one of the rootlets. Taking the section No. 2 for the purpose of a histological description of the tissues, the author gives the following characters: The cortical portion or bark of the root is divided into three parts; an outer layer or periderm, composed of a series of two or three tubular cells of a yellowish-brown color; next a middle layer of thin-walled parenchymatous tissue, the outer cells stretched for the most part in a tangential direction. This layer is very unequally developed when there is a keel to the root, as is the case in this section; on that side it is smallest; from there it increases gradually till it reaches the opposite side, where it displaces more or less completely the inner layer, which is the most fully developed on the keel side, where also may be seen the bast or liber cells, and passing through this tissue, the medullary rays. Although the histological elements of the three sections examined are iden-

tical, yet in their relative proportions the three roots differ materially, and this, the author shows, accounts for the deficiency in active ingredient in the doubtful sample under examination. Trommsdorff and Schneider have shown that the senegin is contained in the parenchymatous tissues of the bark, while the prosenchymatous or woody tissue is inert. On comparing the relation of these to each other in the three roots, the superficial area of parenchymatous tissue to that of woody tissue will approximately stand as follows:

Rootlets,	8.5 to 1.0 (or relatively)	17.
Middle-sized senega,	8.0 to 1.0	" 6.
The senega in question, . . .	1.0 to 1.0	" 2.

The enlarged drawings are to scale, and the relative proportions exactly those of the microscopic sections from which they were drawn. The comparison shows why the rootlets—as determined by Schneider—yield so much more of the active principle than do middle-sized or large roots, and why the sample in question yields a decoction so deficient in strength. But, inasmuch as a sufficient supply of rootlets cannot be obtained, Schneider has advised the use of roots of medium thickness with the rootlets attached.

The keel, generally considered an important feature of good root, is due to a peculiar development of bast or liber tissue on one side; and the same root may be quite round in one part, and have a development of keel in another. Having isolated the elementary organs of a section across the keel of the root, separated the tubular cells of the epidermis, the cells of the parenchymatous tissue, and also the liber cells represented by these waves in cellular tissue, and examined the individual cells as separated, the author has always found that those of the parenchymatous tissue contained granular and oily matter, whilst the liber cells were free from it; and reasoning from analogous instances he is led to conclude that the liber tissue does not equally with the parenchymatous contain the active principle, and this may probably be the reason why middle-sized roots, with less liber tissue, yielded more senegin than those of a large size. Regarding the particular root under examination, the author considers it beyond question that it is a true root of *Polygala senega*, but one that is young and immature, and consequently does not fairly represent the senega of the *Materia Medica*.

Mr. Greenish in this connection takes occasion to draw attention to the importance of the microscope in *Materia Medica*, and expresses the hope that the time is not far distant when vegetable histology, embracing the isolation and microscopical examination of the tissues so isolated, together with the microchemical analysis of the vegetable cell, will take its place by the side of botany in the practical course of study for pharmacists.—*Yearbook of Pharm.*, 1878, p. 521.

Senega—*Adulteration with Asclepias Vincetoxicum, L.*—Mr. E. M. Holmes has recently examined a sample of senega-root, part of a parcel received from Belgium, which proved to be largely adulterated with vincetoxicum root (*Asclepias vincetoxicum, L.*). The fact that the latter is not a native of the United States, as well as the large percentage of the adulterant (33 per cent.), point to its adulteration in the European market. Vincetoxicum-root very closely resembles valerian-root, and, inasmuch as large quantities of it have been imported into England, its use as an adulterant for valerian-root is not at all unlikely, and the following description is therefore given by Mr. Holmes, with a view to its eventual identification in such admixture:

Asclepias Vincetoxicum, L.—The so-called root is in reality a rhizome, having a well-marked pith, remarkable for its pale color and smooth, unbranched rootlets. The main portion is smooth, cylindrical, and pale, and from about one-fourth to one-third of an inch in thickness; at intervals of a half or one inch tufts of rootlets arise. The rootlets are smooth, scarcely furrowed, and by their number often conceal the stouter portion of the rhizome. It is represented along with the root of *Polygala senega* in the accompanying cut (Fig. 40). The taste presents nothing remarkable, and the odor is faint and earthy. When broken across the rhizome is seen to have a yellow centre and white cortical portion. On examination with a pocket lens the yellow portion is seen to consist of wood, and to have in its centre a well-defined pith. The rootlets are similar in structure, but have no pith. While this root, therefore, has no resemblance to senega, except in color, it might nevertheless be overlooked when mixed with it, because senega is sometimes largely composed of small roots.

From valerian it may be known by the smoothness of the rootlets (those of valerian being furrowed), and by the more slender cylindrical stems between two tufts of rootlets, the root-

stock of valerian being so closely covered with rootlets that its larger size is only visible at the upper end, where it may be seen

FIG. 40.



Asclepias vincetoxicum and *Polygala senega*.

to be one-half or three quarters of an inch in thickness, and of a dark color internally. For convenience of reference the author tabulates the distinction as follows :

POLYGALA SENEGA.	VINCETOXICUM.	VALERIAN
Root one-third inch, tapering.	Rhizome one-third inch thick, cylindrical.	Root one-half to one-quarter (<i>three-quarter (?)</i> Rep.) inch, concealed by rootlets.
In section, centre pale, no pith.	In section, centre yellow, evident pith.	In section, darker, rootlets brown with darker centre.
Root spirally twisted, taperingly branched below with keel on concave side.	Rootlets numerous, in tufts an inch apart, pale, smooth	Rootlets grayish, furrowed, covering the root.
Taste acrid, causing salivation.	Taste and odor slight.	Taste bitterish, odor strong.

The root contains, in the cortical portion, starch, while senega

contains none. A curious property of the decoction is mentioned by Feneuille, who found it to be opalescent when heated, and transparent on cooling; a property which might serve to reveal the presence of this drug.—Ph. J. Trans., November 16th, 1878, p. 410.

Monninia Polystachia—*Therapeutic Properties, etc.*—Amongst the medicinal plants recently suggested as possessing important therapeutic value is the *Monninia polystachia*, which has an extensive distribution, growing near the summits of steep mountains in South America as well as in the woody plains and marshy districts of the same region. It is a pretty plant, to which, however, hitherto but little attention has been paid by chemists. Therapeutic virtues have been attributed to two parts of the plant, the bark of the root and the recent leaves. The latter are regarded as expectorant, whilst the former is considered to be astringent. The root of the plant is fusiform, sixteen or eighteen inches in length, of a yellowish color, with scattered darker spots, slightly disagreeable odor, and taste at first sweetish, but subsequently becoming acrid and bitter, and exciting salivation. Its infusion is turbid like soapy water. It is named “yallhoy” by the Americans; the bark of the wood is pounded and made into a paste. No complete chemical analysis has as yet been made of this drug, but it is known to contain a large proportion of resinous matter, which is divisible into three parts: one soluble in ether, a second soluble in alcohol, and a third, to which the name *monninia* has been given. The drug can be administered both in form of powder and infusion, the dose being 10 to 12 grams per diem. The following are some of the preparations:

Tincture.—Bark of the root, 100 grams; alcohol, 300 grams; macerate for four days, frequently agitating, and filter; then add sulphuric ether 150 grams to the residue; macerate for forty-eight hours more, and mix the two liquids.

Ointment.—Extract of monninia (?), 4 grams; lard, 20 grams; essence of lavender, 4 drops. Ft. ung.—Ph. J. Trans., October, 26th, 1878, p. 328; from Estudos Medicos, No. 4, in Practitioner.

PAPAVERACEÆ.

Opium—Cultivation in China.—From a series of reports on the opium trade in China, from the various British consuls residing

in China, an abstract appears in "Ph. J. Trans." (September 28th, 1878, p. 246), from which the following is gleaned:

Though the growth of the poppy is prohibited by the Imperial Government, this prohibition is regarded as a dead letter in many districts, and the cultivation is encouraged by the local authorities, as the inland dues levied on native opium, though lighter than those on the imported drug, are much heavier than on any other description of native produce, and their receipts proportionally greater. The chief opium-producing provinces are Yunnan, Kweichow, Szechuen, Shensi, Shansi, and also Eastern Mongolia and Manchuria. In all these provinces poppy cultivation has made rapid progress, and in some parts the opium has improved in quality. In the northern provinces, Shansi, Shensi, and Kansuh, poppy cultivation requires very great care on the part of the grower, together with the richest possible soil. It is grown with the utmost success on the terrace slopes or on the most fertile bottom-land, which allows of thorough irrigation, and which would be devoted to the cultivation of wheat and vegetables were it not for the very large profits derived from the prepared opium. In these provinces there is a limit beyond which the poppy cannot be raised with remuneration to the grower, and the production is never likely to be much in excess of the demand for consumption. In the southern and central provinces, on the other hand, the poppy cultivation does not interfere to any considerable extent with that of grain, especially in Szechuen, where the difficulties of transport in supplying a deficiency in the local crops from the neighboring provinces renders necessary the retention of large tracts of land for the raising of grain. The soil here is so rich and fertile that the most suitable ground for the poppy is the terraced hillsides, where the effects of the heavy rains, frequent at certain seasons of the year, and which would render the low fields too damp, are, comparatively speaking, unfelt. Sown during November the poppy blossoms early in April, and comes to maturity within a month, thus leaving the fields free for a summer crop. Before the poppy has seeded an intermediate crop of maize, wheat, cotton, or tobacco is grown, the poppy stalks being cleared away in time to prevent interference with the young shoots. The opium yield is very uncertain, being much affected by the state of the weather during the growth of the plant.

In Shantung it appears that native-grown opium is seldom or never used alone, owing to its hot and unpleasant flavor. It is usually mixed with an equal quantity of India opium. The increasing consumption of opium there is stated to be clearly caused by its cheapness, added to the belief that it is less injurious than the Indian drug. Though Bengal opium is chiefly used in the Suchow and Chang-Chow prefectures, the native opium is largely used for mixing purposes, and in the districts north of the Yangtze, where Malwa is chiefly consumed, the native product, although smokers of Malwa are said to take to it less easily than smokers of Bengal opium, has already affected the consumption of the foreign article. The Indian product is almost exclusively used in Shanghai.—Ph. J. Trans., September 28th, 1878, p. 246.

Opium.—Mr. B. S. Proctor has communicated some notes on opium to the British Pharm. Conference. The *crude drug*, excluding exceptional specimens, varies in strength from 4 to 12 per cent. of morphia. The importance of standardizing is too obvious to require enforcement. No one can prudently use opium from either extremity of this scale, and the science of therapeutics can never progress satisfactorily whilst its agents remain of this uncertain force. It is the duty of pharmacy to supply instruments of precision with which the science of medicine can perform this work. Regarding *impurities*, the author observes that it has been sufficiently pointed out that the appearance of Turkey opium, as it occurs in commerce, is but little guide to its morphia value, but it is perhaps not sufficiently acknowledged that no hard-and-fast line can be drawn between genuine and adulterated samples. The only satisfactory definition must lie in general characteristics well known as belonging to the common run of samples, together with an official strength, as regards morphia, defined between two narrow limits, which should fix a maximum as well as a minimum. The *hygroscopic quality* of samples of opium varies very much, some absorbing water with avidity, till they are reduced to the condition of an extract, while others do not under the same circumstances absorb near so much. Constancy in the degree of hydration of the powder will no doubt be best attained by desiccation being carried only to a moderate degree. *Gummy samples* of opium are not infrequently met with. These are characterized by their smooth pilular texture, sugges-

tive of apple or fig pulp; an external covering of a bright-green leaf; and the morphia strength in these samples often sinking down to small numbers or to fractions of a unit, showed them palpably to be sophisticated and unfit for medicinal use. *Mouldy samples* of opium have been found to vary from 6 to 12 per cent. Perhaps a want of odorous matter may be characteristic of these; but from the richness of some of these samples it would not appear likely that the moulding has any injurious action upon the morphia. Some remarks are also made by the author on the *extract* and *liquid extract* of opium, chiefly in reference to their liability to vary in morphia strength, owing to the wide limits of that strength in opium permitted by the British Pharmacopœia, as well as the difference in the absolute yield of extract from opium. The extract should be prepared from opium of definite strength, and made up to a definite quantity by the addition of sugar, gum, starch, or other inert matter. The liquid extract made from morphia of known strength should be made so as to represent 3 grains of morphia in the fluid ounce.

In a former communication Mr. Proctor had occasion to point out the solubility of narcotia in neutral or alkaline solutions of morphia in water. In the present paper he records an observation of the solubility of morphia in benzin in the presence of a considerable proportion of narcotia. This, however, applies to morphia in its free state, and not as it exists in opium, the benzin percolates from opium containing neither morphia nor codeia. This would confirm Mr. Cleaver's mode of analysis (see *Proceedings*, 1878, p. 272), by which the primary extraction of the opium with benzin (or bisulphide of carbon) is required. Mr. Proctor, however, has observed that some samples of opium containing an excess of acid cannot be freed from their narcotia by treatment with either benzin or ether, unless the acid be neutralized and the narcotia thus set free. This may be done by suspending the powdered opium in dry ether and passing dry ammonia through to strong alkalinity, when the narcotia is readily and completely extracted on subsequently percolating more of the solvent, while the morphia salt will have undergone no change and may be subsequently extracted.—*Yearbook of Pharmacy*, 1878, p. 504.

Behar Opium—Analysis of Ash.—Mr. C. J. H. Warden gives the following result of an analysis of opium ash obtained by pre-

serving the ashes of all samples of Behar opium analyzed at the Government Opium Factory, Patna, for some years past :

Fe_2O_3 , 1.9839 ; Al_2O_3 , traces ; Mn_2O_3 , traces ; CaO , 7.1344 ; MgO , 2.3104 ; K_2O , 37.2405 ; Na_2O , 1.7006 ; SO_3 , 23.1419 ; P_2O_5 , 10.9021 ; CO_2 , traces ; Cl , traces ; SiO_2 and sand, 15.2740 = total 99.6878.

The ash was of a very light-gray color, and contained 0.8575 per cent. of charcoal, which was deducted before calculating its percentage composition. It yielded to boiling water 58.4961 per cent. of soluble salts. The large amount of sulphuric acid present in the ash is noteworthy. It is also a constituent of the poppy-plant ash, and Mr. John Scott, in his "Manual of Opium Husbandry," points out that the larger the amount of sulphuric acid in the plant the smaller the yield of morphia, thus :

Sulphuric acid in plant.	Morphia in opium.
5.93 per cent.,	8.66 per cent.
7.64 "	6.47 "
10.08 "	4.65 "

It would be interesting to ascertain whether or not there is a similar correlation between the SO_3 in opium ash and the amount of morphia contained in the drug.—Ch. News, September 20th, 1878, p. 146.

Opium—Rapid Estimation of Morphia.—The errors and difficulties inherent in the various processes followed in the estimation of morphia in opium have frequently been pointed out; one of the best grounded objections being that which is based on the length of the various processes. Mr. A. Petit now proposes the following method, in which he thinks that most of the causes of errors noticed by authors are excluded; whilst the duration of the experiment, which does not exceed two hours, will facilitate assays and the commercial transactions dependent on them, which are often rendered impossible by the length of the analysis. A comparative investigation of the process now proposed, and of that of Guillermond, has given results always to the advantage of the new method. The mode of operating is as follows :

Take 15 grams of the opium to be assayed, suspend it in 75 grams of distilled water, and afterwards throw it upon a filter. Take 55 grams of the filtrate, which would represent 10 grams

of opium, add 3 cc. of ammonia, and agitate. The deposit of morphia takes place rapidly under the form of a crystalline powder. The whole is allowed to stand for a quarter of an hour, and then 27 grams of 95° alcohol are added. After shaking several times, it is again allowed to stand for half an hour, and then thrown upon a tared filter. The alkaloid is washed upon the filter with alcohol of 50°. After washing it only requires to be dried and weighed. The mother liquors left to themselves deposit after 48 hours only a small precipitate, that need not be noticed.

In exact determinations advantage is taken by the author of the property of narcotia of not saturating acid liquors even in the presence of morphia, the quantity of acid required for the saturation of 25 centigrams of the precipitate obtained being ascertained. The acid used was sulphuric, which was titrated so that 10 cc. of it exactly saturated 25 centigrams of pure morphia dried at 120° C. This liquor contains in a liter 4.30 grams of monohydrated sulphuric acid ($\text{SO}_3, \text{H}_2\text{O}$). In practice, however, it is found that the solution of the morphia is facilitated by employing an excess of sulphuric acid solution, and titrating back with a solution of succrate of lime corresponding in its alkalinity to the acidity of the sulphuric acid solution, *i. e.*, that 10 cc. of the succrate will saturate 10 cc. of the sulphuric acid test solution. The 25 centigrams of morphia are dissolved in 20 cc. of sulphuric acid solution; if the morphia is absolutely pure, 10 cc. of the solution of succrate of lime will be required to exact saturation; the quantity required in excess indicates the quantity of impurity, such as narcotia, etc., which is readily ascertained by calculation. Thus 0.5 cc. of succrate of lime in excess of 10 cc. would indicate that 5 per cent. of the morphia is impurity; 0.7 cc., 7 per cent.; 1.0 cc., 10 per cent., etc.—Ph. J. Trans., May 17th, 1879, p. 937; from J. de Ph. et de Chim. (4), xxix, 159.

Sanguinaria—*Some Constituents of the Rhizome*.—Mr. Fred. W. Carpenter has made interesting experiments upon some constituents of the rhizome of sanguinaria. By suitable means he has isolated the so-called "*porphyroxin*,"* which constituted

* "*Porphyroxin*" was obtained by Merck, in 1837, from opium. In 1845 Riegel obtained a second alkaloid from the rhizomes of sanguinaria, which he believed to be identical with Merck's porphyroxin; and Gibb, in 1860, obtained like results.—REP.

minute, nearly colorless crystals; bitter, very sparingly soluble in water, more readily in alcohol; alkaline, readily neutralizing acids and forming salts; the hydrochlorate forming cauliflower-like masses. But a few grains were obtained from a pound of root. It seems to differ decidedly from the porphyroxin obtained by Merck from opium, and is not colored by nitric acid; is dissolved by dilute acids, but does not become red on boiling. But the supposed alkaloid and its salts give a deep-blue or purple color with concentrated sulphuric acid, very much intensified by the addition of a small piece of bichromate of potassium.—A. J. Ph., April, 1879, p. 169.

CRUCIFERÆ.

Horseradish—Mineral Constituents.—A. Hilger has found the fresh roots to contain 83.45 per cent. of water. Dried at 100° C. (= 212° F.), 11.15 per cent. of ash was obtained, and this was analyzed by Bunsen's method. 100 parts of this yielded to water containing CO₂, 72.52 parts; the 27.48 parts insoluble in such water, contained 2.5 per cent. of carbon, and 2.7 per cent. of sand.

The soluble portion contained: CaO, 1.19; MgO, 0.89; Na₂O, 0.28; K₂O, 51.41; HCl, 2.19; SO₃, 22.73; CO₂, 15.31.

The insoluble portion contained: CaO, 35.38; MgO, 11.92; P₂O₅, 41.92; Fe₂O₃, 3.47; CO₂, 7.23; SiO₂, 5.39.—Landw. Versuchs-Stat., 22, pp. 75, 76; in J. Ch. Soc., December, 1878, p. 1000.

CISTACEÆ.

Labdanum—Collection in Greece.—According to Professor X. Landerer, the resinous exudation, ladanum or labdanum, from *Cistus ladaniferus*, L., *C. creticus*, L., *C. salvifolius*, L., and *C. villosus*, L., was formerly collected by means of a special instrument called *ladanostirion*, which consisted of a rod having at one end three cross-pieces attached to it, and provided with numerous strips of leather. By working this sort of whip about and among the cistus bushes, the resin adheres to the leather strips and is afterwards detached and melted. In this condition it is often adulterated with mastic. The accompanying cut (Fig. 41) illustrates the apparatus in question.

This method of collecting labdanum has, for a number of years past, been partially replaced by another, and the labdanum at present in the market might with more propriety be specified as *labdanum e barba* ("labdanum from beards"). It is, namely, at present generally collected from the beards and tails of goats and sheep, which are pastured in herds among the cistus bushes, and to which the resin adheres. On transferring such a herd to the shepherd, the contract between the latter and the owner specifies that the shepherd is to collect so many okas of labdanum (from the wool of the animals), or to pay a certain sum of money. The labdanum obtained in Creta has always a spirally twisted shape; that from Cyprus is in sticks.

FIG. 41.

Instrument for Collecting
Labdanum.

In times of epidemics the inhabitants attach some of this resin to sticks, or carry pieces of it in their hands to smell at. Professor Landerer, while in the Island of Posos (in 1837), where he succeeded in eradicating an epidemic by chlorine fumigations, noticed that everybody carried such sticks.—New Rem., March, 1879, p. 67.

DROSERACEÆ.

Drosera Rotundifolia, L., and *D. Longifolia*, L.—Mr. Pierre Vigier has contributed to "Bull. gén. de Thérap.," July 15th, 1878, an interesting paper, giving a short history of the medicinal application, and his own experience with the long and round leaved species of *sundew*. The sundews appear to have been very early employed as a remedy for consumption. During the sixteenth century, Dodonneus, of Belgium, wrote on and figured the round-leaved and intermediate sundew, but described them as too drying, acrid, and hot to be of any service in consumption. The plants have since been drawn attention to, and their properties have been described by various authors, and it appears that, notwithstanding the acrid character of these plants, they remained in favor as a remedy for phthisis, severe coughs, and the like, until about the middle of the eighteenth century, when they began to fall into discredit, and in the beginning of the present

century were rarely called for. At one time the "Pharmacopœia of Württemberg" contained a compound syrup of *sundew*, and an *elixir pectorale Wedelii*, having sundew as one of the components.

The author's attention appears to have been particularly directed to the *sundews* by the experiments of Dr. Eugene Curie, who, in 1861, reported his observations to the Paris Academy of Science. Mr. Vigier bases his present observations and deductions upon his experience with both the round-leaved sundew (collected in Vosges) and the long-leaved species, since 1863. The various preparations, such as tincture from the fresh and from

FIG. 42

*Drosera rotundifolia*.—*Lin.*

FIG. 43.

Drosera longifolia.—*Lin.*

the dried herb, extract, etc., have the same properties as prepared from both plants. 7 kilos of the fresh plant produce 1 kilo of dry. The dried plant, treated with 60 per cent. alcohol, yields one-fourth of its weight of extract. 1 kilo of the fresh plant gives, with 1 kilo of strong alcohol, 1500 grams of tincture, which, therefore, contains in 1000 the extractive matter of 666 grams of the *drosera*, or 25 grams of extract; 100 grams of the dried plant

will consequently yield a tincture of the same strength as that prepared from the fresh plant as above. The extract is therapeutically active, and easy of administration in the form of pills; 5 grams, with a sufficient quantity of licorice-root, being made into 100 pills. The tincture made from the fresh plant contains all the medicinal principles of the plant. On one occasion an assistant, while expressing the tincture, had kept his hands in it for some time, and found the skin as if it had been burned.

The physiological and therapeutical properties of *drosera* are reported mainly from the observations made by Dr. Curie, and are to the effect that while favorable results were observed in phthisis by the persistent use of the remedy, it failed in most cases, and appears to be best adapted in such which present symptoms of bronchitis. The best results were obtained with daily doses of 10 to 15 grams of the tincture, but much larger quantities may be administered without inconvenience.

Professor Maisch appends to this abstract of Mr. Vigier's paper the botanical description of both plants, from "Gray's Manual," and the cuts of both species in their natural size, as shown by Figs. 42 and 43.—A. J. Ph., November, 1878, p. 536.

Drosera Rotundifolia, Lin.—*Analysis*.—G. Lugan has analyzed the fresh plant. It was treated by dietheralysis, the process recommended by Legrip (see Proceedings, 1876, p. 61). The aqueous liquid obtained thereby contained glucose, various salts and a crystallizable organic acid, which appears to be peculiar to this plant, and was also obtained from the ethereal liquid by evaporating it and treating the residue with chloroform, which leaves it undissolved, together with wax and yellow coloring matter. On evaporating the chloroform a greenish-brown resin was left, which had a strong and characteristic odor, was exceedingly acrid, and produced a burning sensation when applied to the skin. Contrary to the observation of Reiss and Will, the author found the viscous exudation of the glandular hairs to be destitute of acid reaction, and he was unable to obtain formic acid, which was stated to be the principle by which the leaves convert albuminoids into peptones.—A. J. Ph., August, 1878, p. 384; from J. de Ph. et de Chim., June, 1878.

MESEMBRYANCEÆ.

Mesembryanthemum Acinaciforme.—This resembles the strawberry in taste, and is so called. The plant is very productive,

and the fruit is eaten not only by Indians, but also by Mexicans and other whites. It is one of the common plants along the sea-coast of Southern California, growing on sand beaches.—Dr. E. Palmer, A. J. Ph., November, 1878.

CUCURBITACEÆ.

Luffa Echinata, Roxb.—*The Vine and Fruit. Vernacular: Kukarwel (Bombay); The Seeds, Wa-upla-bij (Guz.)*.—The medicinal use of this plant does not appear to be noticed in European works on the *Materia Medica* of India. In the Bombay Presidency it is found only in Guzerat, where it has a reputation among the Hindoos on account of the bitter properties of the fruit, and is an ingredient in some of their compound decoctions. The dried vine, with the fruit attached, is brought to Bombay for sale along with other herbs from the province of Guzerat. The stems are herbaceous, scandent, five-sided, slightly hairy; tendrils two-cleft; leaves generally five-lobed, somewhat hairy; margin scalloped-toothed; petioles as long as the leaves, ribbed. Fruit oval, the size of a nutmeg, armed with numerous long, rather soft, diverging bristles, obscurely divided into three cells by numerous dry fibres, and opening at the top with a perforated stopple, which falls off when the seeds are ripe; seeds about 18, ovate, compressed, black, and scabrous; testa very hard, kernel white. The fibrous substance in which the seeds are inclosed is intensely bitter.—Professor W. Dymock, in Ph. J. Trans., May 3d, 1879, p. 896.

Momordica Charantia, Linn.—*The Fruit. Vernacular: Karela (Hind.); Karla (Bomb.); Pava-Kai (Tam.)*.—There are two chief varieties of this plant, differing in the form of the fruit, the one being longer and more oblong, and the other smaller, more ovate, muricated, and tubercled. There are besides many intermediate gradations. The fruit is bitter but wholesome, and is eaten by the natives of India. That of the smaller variety is most esteemed (Drury). The Hindoos use the whole plant, combined with cinnamon, long pepper, rice, and the oil of *Hydrocarpus inebrians* as an external application in scabies and other cutaneous diseases (Rheede, Wright, and Gibson). The fruit and leaves are administered as an anthelmintic, and are applied externally in leprosy. In “*Makhzan-ul-adwiya*” the fruit is described as tonic and stomachic, and as being useful in rheumatism

and gout and in diseases of the liver. The plant is described by Drury as follows: Climbing; stem more or less hairy; leaves palmately five-lobed, sinuate-toothed; when young more or less villous on the under side, particularly on the nerves; peduncles slender, with reniform bracteole; male with the bracteole about the middle; female with it near the base; fruit oblong or ovate, more or less tubercled or muricated; seeds with a thick notched margin and red aril; flowers middle-sized, pale yellow.

In the rainy season the plant may be seen in almost every garden in Bombay. The fruit is also offered for sale in the market, and, when well cultivated, attains the size of a cucumber.—Professor W. Dymock, in Ph. J. Trans., May 3d, 1879, p. 896.

Cucurbita Perennis (*Chili Cojote of the Mexicans*).—The pulp of the green fruit is used, with a little soap, to remove stains from clothing. The large and long roots, after maceration in water, are applied to piles, generally with good effect, and the seeds, ground fine and made into mush, are eaten as food by many Indians of Arizona and Lower California.—Dr. E. Palmer, A. J. Ph., December, 1878.

Citrullus Vulgaris, Schrad.—*The Seeds. Vernacular: Turbuz* (*Hind.*); *Tarmuj* (*Beng.*); *Turbuj*, *Kalingar* (*Bomb.*); *Pitchapul-lum* (*Tam.*).—The seeds of the watermelon are of interest as being one of the four cold cucurbitaceous seeds of the ancients, which, according to Guibourt, were originally those of *Cucumis sativus*, L., *Cucumis melo*, L., *Cucumis citrullus*, D. C., and *Lagenaria vulgaris*, var. *clavata*, D. C. But he remarks that in Paris the seeds of *Cucurbita pepo*, Duch., and *Cucurbita maxima* (the potiron of the French), are now substituted for those of *Cucumis citrullus* and *Lagenaria vulgaris*. In Bombay, Professor Dymock states, the four cold cucurbitaceous seeds sold in the bazaars are those of *Cucumis utilissimus*, *Cucumis melo*, *Benincasa cerifera*, and *Citrullus vulgaris*. These seeds are in great demand, and are kept decorticated and ready for use. The natives always use them together, and consider them to be cooling, diuretic, and strengthening.—Ph. J. Trans., June 14th, 1879, p. 1015.

Ecbalium Elaterium, A. Richard.—Under the name of “Kateri-indrayan” the fruit of this plant in a dried state is sold in the Bombay shops. It is imported from Persia, and has evidently been gathered while immature, as the contents of the cucumbers

have not been discharged. Elaterium does not appear to be known in Hindoo medicine, but the Arabs and Persians are well acquainted with it. The fruit is called "Katha-ul-himar" by the Arabs, and "Khiyar-i-khar" (asses' cucumber) by the Persians. The fruit, as well as the method of preparing elaterium, is described by the author of "Makhzan-ul-adwiya," the latter being as follows: The fruit is sliced, thrown upon a strainer, and pressed; the pulp is then to be washed twice with water, and the deposit which is thrown down from the water collected and dried. It is then to be finely powdered and made into lozenges with an equal weight of gum arabic or calamine, or half its weight of starch. Mohammedan writers attach considerable importance to elaterium as a purgative of the diseased humors, which they suppose to be the cause of a great number of diseases. They also use poultices made of the fruit, leaves, and root of the plant, and direct the juice of the fruit to be snuffed up the nose to purge the brain, and to be dropped into the ear in otitis. It is worthy of remark that the Hindoos use their bitter and purgative cucurbitaceous fruits in the same manner. The bazaar elaterium fruits gave 5 per cent. of elaterin.—Professor W. Dymock, in Ph. J. Trans., June 14th, 1879, p. 1015.

Lagenaria Vulgaris, *Seringe*, var. *Amara*—*The Fruit*. *Vernacular*: *Tumbi*, *Karwee-tumbi* (*Hind.*); *Tiktalaw* (*Beng.*); *Karwabopla* (*Bomb.*); *Shora-Kai* (*Tam.*).—The bottle-gourd, of which there are two varieties, a sweet or cultivated one, called in Sanscrit "alāhu," and a bitter wild one known as "Katu-tumbi," is very common in India. The wild fruit grows to a very great size and varies much in shape; those which are bottle-shaped serve a variety of useful purposes, being made into guitars, bottles, floats for crossing rivers, etc. The outer rind is hard and ligneous, and incloses a spongy white flesh, very bitter, and powerfully emetic and purgative. The seeds are gray, flat, and elliptical, surrounded by a border, which is inflated at the sides but notched at the apex; their kernels are white, oily, and sweet. In Bombay the pulp, in combination with other drugs, is used in native practice as a purgative; it is also applied externally as a poultice. The seeds were originally one of the four cold seeds of the ancients, but pumpkin-seeds are now usually substituted for them. The Hindoos administer a decoction of the leaves in jaundice; it has a purgative action.—Professor W. Dymock, in Ph. J. Trans., May 3d, 1879, p. 896.

PAPAYACEÆ.

Carica Papaya—*Fermentative Action of the Juice*.—It has long been known that the unripe peeled *papaw* fruit has the property of rapidly softening the toughest meat when boiled with it a short time. Indeed in Quito the use of carica-juice when boiling meat is very general. Mr. Wittmack has now made some experiments with the juice to determine the characters upon which this peculiar property depends. After repeated incisions of a half-ripe fruit, he obtained only 1.195 grains (grams?) of white milky juice of the consistence of cream. This dried in a watch-glass to a hard vitreous white mass, having what appeared to be greasy spots on the surface, but what really were flocks of gelatinous substance that always adheres to the more hardened material. The odor and flavor of the fresh juice recalled that of petroleum or of vulcanized india-rubber. The microscope showed it to be a fine grumous mass, containing some larger particles and isolated starch grains. Iodine colored the juice yellowish-brown. A portion of the juice was dissolved in three times its weight of water, and this was placed with 10 grams of quite fresh lean beef, in one piece, in distilled water, and boiled for five minutes. Below the boiling-point the meat fell into several pieces, and at the close of the experiment it had separated into coarse shreds. In the control experiments, made without the juice, the boiled meat was visibly harder. Hard-boiled albumen, digested with a little juice at a temperature of 20° C. (= 68° F.), could after twenty-four hours be easily broken up with a glass rod. 50 grams of beef in one piece, enveloped in a leaf of *C. papaya* during twenty-four hours at 15° C. (= 59° F.), after a short boiling became perfectly tender. A similar piece wrapped in paper and treated in the same manner remained quite hard. Some comparative experiments were also made with pepsin and the following are the conclusions arrived at by the author:

1. The milky juice of *Carica papaya* is (or contains) a ferment which has an extraordinary energetic action upon nitrogenous substances, and like pepsin curdles milk.

2. This juice differs from pepsin in being active without the addition of free acid,—probably it contains a small quantity,—and further it operates at a higher temperature (about 60°–65° C. (= 140°–149° F.)) and in a shorter time (five minutes at the most).

3. The filtered juice differs chemically from pepsin in that it gives no precipitate on boiling, and further that it is precipitated by mercuric chloride, iodine, and all the mineral acids.

4. It resembles pepsin in being precipitated by neutral acetate of lead, and not giving a precipitate with sulphate of copper, and perchloride of iron.—Ph. J. Trans., November 30th, 1878, p. 449.

COMBRETACEÆ.

Terminalia Chubula, Retz.—The fruit—*Har* (Hind.), *Hirda* (Bomb.), *Kaduk-Kai* (Tam.), *Haritaki* (Beng.)—was highly extolled by the ancient Hindoos as a powerful alterative and tonic. Sanscrit writers describe seven varieties of haritaki, which, however, are nothing more than the same fruit in different stages of maturity. Chebulic myrobalans are considered to be laxative, stomachic, tonic, and alterative. They are found in the Bombay shops in six varieties, known under as many different modifications of the name “Halilek,” and representing the myrobalan in its different stages of development: 1. The very young fruit, about the size of cumin-seeds; 2. When about the size of a grain of barley; 3. When about the size of a raisin; 4. When half arrived at maturity and yellowish; 5. When still further advanced; 6. When quite mature. Of these the third (Halilek-i-Hindi) and the last (Halilek-i-Kabuli) only are in general use, and the others are only occasionally met with in the Bombay shops. The unripe fruit (Halilek-i-Hindi) is most valued on account of its astringent and aperient properties. Dr. Waring found six of the mature fruits an efficient and safe purgative, producing four or five copious stools, unattended by griping, nausea, or other ill effects. The immature fruit has been found useful by Professor Dymock in diarrhœa and dysentery, given in doses of a drachm twice a day. The mature myrobalan is of an ovoid form, from 1 to 1½ inches long, sometimes tapering towards the lower extremity, obscurely 5 or 6 sided, more or less furrowed longitudinally, covered with a smooth yellowish-brown epidermis, within which is an astringent pulp, inclosing a large, rough, long, one-celled endocarp. The unripe fruits are shrivelled, black, ovoid, brittle bodies, from ½ to ¾ of an inch in length, having a shining fracture and an extremely astringent taste. On careful examination the rudiments of the nut may be distinguished.—Professor W. Dymock, in Ph. J. Trans., May 3d, 1879, p. 895.

Terminalia Bellerica (Roxb.).—The fruit—*Bhairah*, *Bahera* (Hind. and Beng.), *Behara*, *Yella* (Bomb.), *Tanrik-kay* (Tam.) is considered by Hindoo physicians to be astringent and laxative, and is prescribed in affections of the chest and throat. As a constituent of the triphála (three myrobalans) the belleric myrobalans are employed in a great number of diseases. The kernel of the fruit is narcotic if taken in a large quantity, and is sometimes used as an external application to inflamed parts. Formulas for the administration of this myrobalan as a pectoral will be found in Dutts's "Hindoo Materia Medica." The part used medicinally is the pulp. The fresh drupe is obovate, the size of a nutmeg, somewhat pentagonal, fleshy, covered with a gray silky tomentum. When dry it is a little larger than a gallnut, of a dirty-brown color and astringent taste. The stone is hard and incloses a sweet oily kernel, which has undoubted narcotic properties.

The tree produces a quantity of gum. This is in vermicular pieces about the thickness of a finger, of the color of inferior gum arabic, hardly at all soluble in water, in which it, however, swells up and forms a bulky gelatinous mass. Its taste is insipid. Roxburgh's statement that it is perfectly soluble in water, and Drury's, that it burns like a candle, are not confirmed by the author.—Professor W. Dymock, in P. J. Trans., August 24th, 1878, p. 146.

MYRTACEÆ.

Australian Eucalypts—Comparative Analysis and Value.—Mr. R. D. Adams, of Sydney, N. S. W., has communicated to "Chem. News" (April 18th, 1879, p. 169), the following special information as to a comparative analysis of some of the various Eucalypti by Baron Ferdinand Von Mueller, from which it will be seen that the celebrated *E. globulus* is by no means the richest in the essential oil which gives the peculiar sanitary value to this class of trees, although the rapidity of its growth and fulness of foliage somewhat compensates for its deficiency in this respect. It is

Eucalyptus Amygdalina which yields more volatile oil than any other tested, and which therefore is largely chosen for distillation; thus it is also one of the best for subduing malarial effluvia in fever regions, although it does not grow with quite the same ease and celerity as *E. globulus*. The respective hygienic value of

various eucalypts may to some extent be judged from the percentage of oil in their foliage, as given below, and as ascertained by Mr. Bosisto at the author's (Baron Von Mueller) instance, for the Exhibition of 1862 :

<i>E. amygdalina</i>,	.	.	.	.	3.318	per cent. volatile oil.
<i>E. oleosa</i>,	.	.	.	.	1.250	" "
<i>E. leucoxydon</i>,	.	.	.	.	1.060	" "
<i>E. goniocalyx</i>,	.	.	.	.	0.914	" "
<i>E. globulus</i>,	.	.	.	.	0.719	" "
<i>E. obliqua</i>,	.	.	.	.	0.500	" "

The proportion of oil varies somewhat according to locality and season. *E. rostrata*, though one of the poorest in oils, is, nevertheless, important for malarial regions, as it will grow well on periodically inundated places, and even in stagnant water not saline. *E. oleosa* (F. V. M.), from the desert regions of extra-tropic Australia, might be reared on barren lands of other countries for the sake of its oil. According to Mr. Osborne's experiments, eucalyptus oils dissolve the following, among other substances, for select varnishes and other preparations: Camphor, pine-resins, mastich, elemi, sandarac, kauri, dammar, asphalt, xanthorrhœa-resin, dragons'-blood, benzoin, copal, amber, anime, shellac, caoutchouc, also wax, but not gutta-percha. These substances are here arranged in the order of their solubility. The potash obtainable from the ashes of various Eucalypts varies from 5 to 27 per cent.* One ton of the green foliage of *E. globulus* yields about 8½ lbs. of pearlash. A ton of the green wood, about 2½ lbs.; of dry wood, about 4½ lbs. Experiments are being made with the pure seeds of various kinds of trees, and from various parts of the colony, so as to see what sort will suit various soils and climates; and Mr. Adams trusts that in the course of a few years the right sorts to thrive, either in temperate England or torrid India, may be accurately known, and reliable plantations thus secured.

Eucalyptus Globulus—*Successful Cultivation near the Baltic Sea*.—Messrs. Mosler and Goetze state, that notwithstanding the cold winds which prevail in Greifswald, from its situation near the Baltic Sea, and the long winter, which lasts from four to six months, the Eucalyptus thrives out of doors for the remainder of the year, and has been cultivated with a view to its influence

* 0.5 to 2.7 per cent. ?—REP.

upon malarial poison. The experiment of growing it in pots in the hospital wards as a means for improving the local air appears to have been quite successful, and meets with much favor.—New Rem., June, 1879, p. 163; from Brit. Med. Jour.

Myrtus Communis, L.—*Use of the Volatile Oil in Medicine*—The flowers and leaves of the common myrtle contain an essential oil, which, when freshly distilled, is dark-colored, but by rectification may be obtained colorless, and which possesses in a high degree the odor of the plant. It is lighter than water, and evaporates readily at the ordinary temperatures. It boils at 160° and 170° C. (= 320° and 338° F.). On exposure to air it does not become colored, nor does it resinify, differing in this respect from oil of turpentine. It is soluble in fixed oils and fats, in ether and in alcohol. Applied to the sound skin it has no effect, but on a denuded surface it produces irritation. It is a carminative stomachic, and may be used as such in doses of about 10 drops. An overdose produces headache, a sensation of fatigue, and prostration. It is an excellent antiseptic.—N. Rem., February, 1879, p. 51; from J. de Ph. et de Chim., 1878, 551.

Myrtus Chekan.—Under the name of chekan, chequen, or cheken, this plant has long been known and used in Chili, in cases requiring an aromatic astringent of considerable power, and it is spoken of very highly by Dr. Dessauer, of Valparaiso, who finds it to possess tonic, expectorant, diuretic, and antiseptic properties. A considerable quantity of the leaves have been recently imported into England for trial, and Mr. E. M. Holmes communicates the following character of the plant itself, as well as the drug:

Myrtus Chekan, Spreng., is an evergreen shrub, from 4 to 6 feet high, indigenous to the central provinces of Chili, where it grows abundantly, forming a kind of underwood in all the quebradas or ravines which follow the course of small streams. In general character the plant bears a strong resemblance to the common myrtle (*Myrtus communis*); it is much branched, the leaves are evergreen, opposite, entire and smooth, oval-lanceolate in shape, from one-half to two-thirds of an inch long, and about half as broad, and tapering towards either end, the largest leaves not being more than one inch long and eight lines broad. The flowers are white, and resemble those of the myrtle in appearance, and are solitary in the axils of the upper leaves. When these leaves fall off, as they sometimes do, the flowers have the appearance of being arranged in terminal racemes or cymes,

and have been thus described by some authors. They differ from those of the common myrtle in having only four petals, which are more rounded, and, as well as the sepals, ciliate at the margin. The leaves also are shorter and broader in proportion than in those of the common myrtle.

Chekan Leaves, as now offered in commerce, present the following characters: The leaves vary from one-half to one inch long by one-quarter to one-half inch broad; they are oval-lanceolate in outline, are furnished with a very short stalk, less than one inch long, are of a clear green color, scarcely paler on the under side, a little depressed above the midrib, and slightly rolled back at the edges by drying; the veins of the leaves are scarcely visible on the upper side, and only slightly so on the lower. Both surfaces of the leaves present a minute wrinkled appearance. When held up to the light the leaves are seen to be dotted all over with minute oil-glands. When chewed the leaves first produce in the mouth a peculiar taste, resembling faintly that of bay-leaves; in this case, however, followed by a pungency and slight bitterness, due to the setting free of the essential oil; this taste is then succeeded by astringency. Some preliminary examination made by Mr. C. H. Hutchinson reveals the presence of tannin, evidently belonging to the gallo-tannic acid group, and of a volatile oil resembling oil of bays in odor, in being lighter than water, etc. It is soluble in chloroform, ether, and ethylic and amylic alcohols, but insoluble in water.

Regarding the pharmacy of the drug, Dr. Dessauer uses the leaves and shoots in the form of infusion, fluid extract, syrup, and inhalation. It appears to be preferably used in the form of aqueous preparations, but from the character of the oil it would seem that the alcoholic preparations are more useful.—Ph. J. Trans., February, 8th, 1879, p. 653.

Careya Arborea, Roxb.—*The Flowers and Bark. Vernacular: Kumbha Kummeo (Bomb.); Pootatanni-maram (Tam.)*.—The tree has a rough bark, the interior of which is red and very fibrous; it gives out much mucilage when moistened, and is used on this account for preparing emollient embrocations. The calyces of the flowers are sold in the Bombay shops under the name of *Wakoombah*; they are clove-shaped, 4-partite, fleshy, of a greenish-brown color, and about an inch long. When placed in water, they become coated with mucilage, and emit a sickly odor. The natives use them as a demulcent. The tree yields a gum resembling mango

gum, almost black, and forming with water a tolerably thick mucilage of a dark-brown color.—Prof. W. Dymock, in Ph. J. Trans., May 3d, 1879, p. 895. •

ALANGINACEÆ.

Alangium Lamarckii, Thwaites—*The Root-bark. Vernacular: Dhera, Akola, Ankool (Hind. and Bomb.); Azhinji-Maran (Tam.) Dhalakura (Beng.)*.—The root-bark of this tree, mentioned in Sanscrit works as “ankota,” has in India a reputation in leprosy and skin diseases. Mr. Moodeen Sheriff has recently drawn attention to its emetic action in his “Supplement to the Pharmacopœia of India.” He says it has proved itself an efficient and safe emetic in doses of fifty grains; in smaller doses it is nauseant and febrifuge. The bark is very bitter, and its repute in skin diseases is not without foundation. If it is continued for a sufficient period its influence over them is greater than that of *Calotropis gigantea*. Professor W. Dymock observes that the tree is not uncommon in the Concons and Deccan; it may be seen at Elephanta, near Bombay; also at Tanna. He has never seen it used medicinally. Synonyms are: *A. decapetalum*, *A. hexapetalum*, and *A. tomentosum*, Lam.—Professor W. Dymock, in Ph. J. Trans., June 14th, 1879, p. 1017.

MELASTOMACEÆ.

Osbeckia Rotundifolia, Sm. (*Dissotis Plumosa. Benth.*).—The plant is used by the natives of Liberia, under the name of

Cream of Tartar plant, as a diuretic and alterative, in the same way that cream of tartar is used in England.—E. M. Holmes’s “Notes on Liberian Drugs,” in Ph. J. Trans., April 19th, 1879, p. 853.

SALICARIACEÆ.

Ammannia Vesicatoria, Roxb.—*The Properties of this Plant—Dad-mari (Hind.); Aginbuli, Guren, Bhar-jambool (Bomb.); Kallurivi, Nirumel-neruppu (Tam.)*.—Its use by the natives of India as a blistering agent appears to have been first brought to the notice of Europeans by Roxburgh. Ainslie quotes him, and remarks that the plant has a strong muriatic smell, but not disagreeable; the leaves are extremely acrid, and are used by the natives to raise blisters in rheumatism, fevers, etc.; the fresh leaves, bruised and applied to the part intended to be blistered, perform their office in half an hour and most effectually. The

authors of the "Bengal Dispensatory," on the contrary, speak unfavorably of the action of the leaves, stating that the effect requires much longer time and that they cause more pain than does cantharides, and this unfavorable statement has been accepted by the authors of the "Pharmacopœia of India." Professor Dymock has now made some experiments with an ethereal tincture of the leaves, which lead him to form a much more favorable opinion of them; in several instances it blistered rapidly, effectually, and without causing more pain than the liquor epispasticus of the Pharmacopœia (Br.?), which it resembles in color; upon evaporation a dark-green resinous extract is left.

The plant, which is common in low moist ground in the neighborhood of Bombay, and appears in November and December, retains its properties when dried. It is herbaceous, erect, much-branched, and has a foliage something like rosemary; stems four-sided; leaves sessile, opposite, lanceolate, attenuated, about an inch long, and one-eighth inch broad, much smaller on the upper parts of the plants; calyx four-cleft to the middle, lobes acute; accessory teeth very small; flowers very minute, aggregated in the axils of the leaves, almost sessile; tube of the calyx at first narrow and tightened round the ovary, in fruit, cup-shaped petals wanting; capsule longer than the calyx, one-celled; flowers red. The whole plant has an aromatic and rather agreeable odor, which it retains when dry.—Professor W. Dymock, in Ph. J. Trans., August, 1878, p. 145.

Lawsonia Alba, Lam.—*The Leaves and Flowers.* Vernacular: *Mehudee* (Hind. and Bomb.); *Marutouri*, *Aivanam* (Tam.); *Mehedi* (Beng.)—The leaves of the henna plant are opposite, smooth, short-petioled, oblong, or broad-lanceolate, pointed at both ends, an inch or more long, and less than half an inch broad. The flowers are in terminal globular, cross-armed panicles, small, greenish-yellow, and very fragrant. The fruit is round, the size of a pepper-corn, four-grooved, with the apex depressed, four-celled. The seeds are angular. The decoction of the leaves is of a deep-orange color, which is destroyed by acid, and deepened by alkalies and vegetable astringents; it stains the skin of an orange-red color, which does not disappear until the epidermis has been removed.

Henna is much esteemed by the Mohammedans. In Arabic it is called "Hinna." Arabic and Persian works give *Arkán* and *Fakúliyún* as the Greek names. They describe it as a valuable

external application in headache, combined with oil so as to form a paste, to which resin is sometimes added. It is applied to the soles of the feet in small-pox, and is supposed to prevent the eyes being affected by the disease. It also has the reputation of promoting the healthy growth of the hair and nails. An ointment made from the leaves is spoken of as having valuable healing properties. The bark is given in jaundice and enlargement of the spleen; also in calculous affections, and as an alterative in leprosy and obstinate skin diseases; in decoction it is applied to burns, scalds, etc. The seeds, with honey and tragacanth, are described as cephalic. An infusion of the flowers is said to cure headache, and be a good application to bruises. An ointment is also used for the latter purpose, and a perfumed oil is prepared from them, which is called in Arabic Duhn-ul-fágiya, and is used as a cosmetic.—Professor W. Dymock, in Ph. J. Trans., May 3d, 1879, p. 894.

ROSACEÆ.

Almonds.—Dr. G. Vulpinus has recently observed an interesting malformation in sweet almonds, apparently resulting from the exudation of bassorin from one of the halves of the almond. The affected half was composed almost entirely of bassorin, was consequently hard and tough, and exhibited a bright resinous surface. Although the formation and exudation of gum in plants belonging to the amygdalæ is, as is well known, of common occurrence, the exudation from the seeds of the almond seems hitherto not to have been noticed. Professor Flückiger, in whose collection these peculiar almonds have been placed, is also unfamiliar with such malformations.—Arch. J. Ph., July, 1878, p. 38.

Prunus Bokhariensis (Royle).—The Bokhara plum—*Alu Bokhara* (Hind., Bomb., Pers.), *Alpogada pazham* (Tam.)—in a dry state is commonly met with in Indian bazaars, being used much as prunes are in Europe. As met with in commerce it is about the size and shape of the latter, but of a lighter color, showing that in the fresh state it must have been yellow or green, and not purple. It is very acid, but on the addition of a little sugar the taste is agreeable and refreshing. The Bokhara plum may be considered the officinal prune of India and may be made use of in the preparation of confection of senna, and for any other purpose to which prunes are applicable.

The author of the "Makhzan-ul-adwiya," after noticing several kinds of plum which are common in Persia and the neighboring countries, goes on to say that for medicinal purposes the amber-colored Bokhara plum is to be preferred. He describes it as sub-acid, cold and moist, digestive and aperient, especially when taken on an empty stomach, useful in bilious states of the system and heat of body. The root, he says, is astringent, and the gum a substitute for gum arabic, and often called Persian gum. He also notices the wild plum—probably *P. spinosa*—and says that a kind of dry cake is prepared from the pulp and used medicinally on account of its acid and astringent qualities.—Professor W. Dymock, in Ph. J. Trans., August 24th, 1878, p. 145.

Cerasus Illicifolia.—The plant is common in California and is very productive. Its fruit is yellow, with a pink tinge, has the shape of gage plums, and possesses little pulp. Indians eat the fruit and save the seeds, which are large and afford much food, being consumed raw, or when dried whole or split are ground and cooked into mush. The wild cherry of Southern California,

C. Demissa, is a dwarf bush, but very productive. Its fruit is palatable, either fresh or dry, and in both conditions it is largely consumed by the Indians.—Dr. E. Palmer, A. J. Ph., November, 1878.

Fragaria Vesca—*Components of Strawberry Roots*.—Dr. T. L. Phipson has found in strawberry roots some substances which are closely allied to some which are contained in cinchona barks. There exists in the root a kind of tannin of a very pale yellow color, which is soluble in water and alcohol, and strikes a green color with salts of iron. It is soluble in water, slightly acidulated with hydrochloric acid; but with more hydrochloric acid it combines to form an insoluble compound, and is also precipitated in purple flocks by alkalies. This tannin, which for the present the author calls

Fragarianin, appears to be closely allied to cinchotannic acid, but instead of yielding *cinchona red*, like the latter, it yields a somewhat similar substance, which the author calls

Fragarin.—It is obtained by extracting the root with water, containing 5 per cent. hydrochloric acid, by maceration for forty-eight hours, and boiling the pale golden yellow filtrate with more hydrochloric acid to strong acidification, for an hour or two, whereby an abundant reddish-brown precipitate forms, which is

collected, washed, and dried. The filtrate contains glucose. *Fragarin* is an amorphous reddish-brown powder, highly electrical by friction, soluble to some extent in water, alcohol, and ether; soluble in potash with a reddish purple, in concentrated sulphuric acid with a brownish-purple color, and forming a conjugated acid. It is not affected by boiling hydrochloric acid. With nitric acid it forms a brilliant yellow nitro-compound, different from picric acid, yielding no picramic acid when reduced by sulphide of ammonium. Chlorate of potassium and hydrochloric acid mixture yields a bright yellow chlorine compound, insoluble in water, decomposed by ammonia. It is best distinguished from *cinchona red* by the reddish or brownish purple color it gives when dissolved in potassa, the cinchona red giving a dirty green color. Besides these two substances the strawberry root yields a compound very similar to *quinovin*; at least a body similar in many respects to *quinovic acid*, but probably not identical with it, can be obtained by the usual method. There is also a small amount of gallotannic acid, but no alkaloid. The author continues his investigations.—Ch. News, September 13th, 1878, p. 135.

Cydonia Vulgaris—*Occurrence and Uses in Greece*.—Professor X. Landerer writes that the quince tree is common throughout Greece. On the island of Crete there are whole forests of these trees; so also near the Turkish town opposite the city of Salonica, in Macedonia. A most abundant supply of quince seeds could be obtained from many localities if the least care were taken in collecting them; but they are universally thrown away. Only housewives occasionally preserve them to make quince tea for the children affected with cough or throat troubles. There are a number of varieties: some are sweetish, others more acrid. The latter are called *struthia* in Asia. The Turkish name of the quince is *aïva*, which has given its name to the Turkish city of Aivaly, in Anatolia, whence large quantities are exported. An intoxicating liquor is prepared from the fruit, which was already known to the ancients as "Cydonian wine." A special kind of confection, or quince paste, is also prepared from them and used as preserves on the table.—New Rem., April, 1879, p. 99.

LEGUMINOSÆ.

Myroxylon Peruiferum, Linn. fil.—(*Myrospermum Peruiferum*, D. C.; *M. Erythroxyllum*, Fr. Allem).—Dr. Th. Peckolt has com-

municated a very interesting paper in which he gives the results of chemical investigations made upon the various parts of this valuable tree, including the "balsam" and other products obtained by him.

The tree is indigenous in Peru, Southern Mexico, Bolivia, and in Western Brazil. It is also met with in the forests of the province of Rio de Janeiro—there known by the name of "oleo vermelho" (red oil),—where Dr. Peckolt has had opportunity to observe it and study its character. He says that it is justly regarded one of the most important representatives of the primeval forests, being often 6 to 6½ meters in circumference, and 25 meters high, and noticeable at a distance on account of its handsome, glistening-green foliage. In the month of August it produces its small, white, but pleasantly odorous (like jasmine) flowers, which produce, in December, small, single-seeded pods, thickened at the end into a balsam reservoir. It prefers humid mountain-valleys, and is seldom found at an altitude of over 150 to 200 meters, giving place at higher altitudes to its balsamic relative, "*Myrcarpus fastigiatus*, Fr. Allem,"—the *Olco-pardo* or *Cabureiba*; hence the tree is found only upon somewhat moist, but otherwise excellent, humus-soil; its presence is regarded by the husbandmen as indicative of suitable soil for cultivation. Formerly thousands of these trees were destroyed along with other trees when clearing land for agricultural purposes; but its value is so generally recognized, that the tree is now carefully preserved. All parts of the tree, in fact, are put to good use. The leaves furnish an agreeable and popular tea; the pods contain at the extremity, as already stated, a gland containing balsam—an aromatic, pleasantly odorous, resinous oil, which is collected by the Indians with the greatest care, and was formerly found in Brazilian commerce under the name of "anguay do Guarani." The bark is used as an excellent remedy for healing wounds, and is also used as tea in pulmonary complaints. The root-bark is even superior to that of the stem, and is reputed to have anti-syphilitic virtues. The wood is reddish-brown, has an odor resembling a mixture of turpentine and balsam of Peru, and has a specific gravity of 0.947; it is stated, however, that the firm splint has a specific gravity of 1.050. The latter has a handsome red color, and possesses a stronger and more pleasant odor. The planters use the wood preferably for water-wheels, wagon axles, and similar purposes. For building purposes it also serves an excellent purpose, particu-

larly for outside work, since it is not readily affected by exposure to moisture. It acquires polish readily, and is therefore also valued for furniture. The charcoal is quite heavy, and is valued by blacksmiths. Indians use splints of the wood for torches.

The close relation of this tree to *Myroxylon Pereiræ* rendered it probable that it would yield Peruvian balsam when subjected to the same treatment as is the latter in San Salvador. His correspondence with the late Mr. D. Hanbury induced Dr. Peckolt to make the attempt according to the directions therein given. Selecting a vigorous tree, about half a mile from his residence, the bark was beaten with a hatchet at a height of one meter on two sides of the tree, the loose bark on the trunk was charred with torches, and the exposed places were then wrapped with strips of shirting, removed every morning and evening for two weeks, and, since no balsam could be obtained from them by expression, boiled in water, the balsam being removed from the surface of the water while the liquid boiled. This proves the incorrectness of Th. Martius's opinion, expressed in some of his writings, that the balsam could not be skimmed off from the surface, but that it would sink to the bottom. Dr. Peckolt finds that it can all be collected from the surface while the liquid boils, and that while the greater part of the balsam sinks to the bottom on the cooling of the liquid, a portion—about one-third—remains suspended, and the portion deposited is less odorous than that skimmed from the hot liquid. The quantity of balsam obtained during the two weeks from the tree (which was twenty meters high) was only 230 grams. It was dark-brown, of pleasant benzoic and vanilla-like odor, stronger and more agreeable than the commercial Peruvian balsam, and had a specific gravity, at 17° C. (=62.6° F.), of 1.031. The water in which the rags had been boiled, was subjected to examination, was found to contain benzoic acid, resin, and dextrin, but no cinnamic acid, or myroxilin, as had been expected. The author believing that in the preparation of balsam of Peru, this portion is not sacrificed, but that the water is evaporated to the consistence of an extract, and then mixed with the balsam previously skimmed off, subsequently collected the balsam from a younger tree, evaporated the water used for boiling the rags, and mixed the extract with the skimmed balsam. The latter amounted to 110 grams; the watery extract, which was thin-syrupy, had a pleasant benzoin odor, and amounted to 3.558 grams, and mixed well with that obtained by skimming, and the result-

ing balsam now had a specific gravity of 1.121, approaching near to that which is given for true Peruvian balsam—1.150 to 1.160.

The Leaves of M. Peruiferum have a faint balsamic odor; 10 kilograms fresh leaves yielded by distillation 5.603 grams of volatile oil, having a faint, but pleasant and peculiar odor, and a specific gravity at 14° C. (= 57.2° F.) of 0.874.

The Pods of M. Peruiferum, limited quantities of which could be obtained only, were subjected to analysis, with the following result: Moisture (and vol. oil?), 22.558; pleasantly odorous, colorless balsam, 16.861; pleasantly odorous, soft resin, 6.163; odorless, resinous acid, 1.050; albuminoid matter, 1.500; amylaceous matter, 19.000; glucose, 2.200; pectin, dextrin, inorganic substance, etc., 2.755; lignin, 27.913. The balsam was extracted, direct by ether, in the colorless condition. It is readily soluble in alcohol; insoluble in solution of potassa, but immediately acquires a magnificent red color; upon addition of alcohol a solution is formed, which, after a day, again becomes colorless.

The Bark of M. Peruiferum is smooth when fresh, gray-green externally, light brown internally, 8 to 10 mm. thick in old trees, and of a very pleasant balsamic odor, which becomes very faint on drying. 36 kilograms, distilled with water, yielded, after four times repeated distillation, only 30 grams of volatile oil. This appears to be very difficult to separate from the bark, the last distillation still yielding some oil. It is transparent, yellowish, and bears much resemblance, both in appearance and odor, to essential oil of almonds deprived of hydrocyanic acid. Its taste is acrid, burning, and aromatic; its specific gravity at 13° C. (= 55.4° F.), 1.017. From another lot of bark, which had become partially dried, a smaller yield of oil was obtained. It distilled over more rapidly, however, and was specifically heavier—1.139 at 15° C. (= 59° F.). An oil specifically lighter than water was obtained by subjecting carefully dried bark to distillation. 36 kilograms yielded only 1.688 grams of a light-yellow oil, becoming brown in a short time, and having a specific gravity, at 17° C. (= 62.6° F.), of 0.924. This is designated by the author as β oil of the bark; the heavy as α oil of the bark. The *heavy oil* is readily dissolved by ether, chloroform, and absolute alcohol; one part requires 30 parts alcohol of 28° Cartier, 10 parts alcohol of 36° Cartier, and 980 parts water for solution. The *light oil* is more readily dissolved by the same solvents than the heavy oil. Both of these

oils were subjected to the action of the usual reagents, with results which are best studied in the original paper. By digestion with alcohol and treatment of alcoholic extract with water to exhaustion, 22.708 per cent. of a red-brown balsamic resin remained, which, by appropriate means, was separated into the following components: 1, pleasantly odorous α acid resin, 2.568 per cent.; 2, odorless β acid resin, 1.782 per cent.; 3, balsamic γ acid resin, 10.458 per cent.; 4, δ acid resin of cinnamon-like odor, 5.688 per cent.; 5, pleasantly odorous soft resin, 28.443 per cent.; 6, odorless resin, 8.708. These are separately described, and their reactions given. The constituents of the bark are enumerated by the author as follows: 1000 grams of fresh bark contained: 0.900 grams volatile oil; 4.660 grams myroxylin (crystallized); 20.000 grams balsamic extractive matter; 10.290 grams bitter extractive; 1.840 grams odorless and tasteless extractive; 5.530 grams waxy matter; 12.120 grams albuminoid matter; 151.970 grams resins; 9.770 grams cinnamic acid; traces of benzoic acid; 5.940 grams tannic acid (iron greenish); 43.520 grams amylaceous matter; 16.120 grams glucose; 26.040 grams pectin substances, dextrin, inorganic salts, etc.; 691.300 grams lignin and moisture.*—Z. Oest. Apoth. Ver., February 1st, 1879, pp. 49–57; April 1st, 1879, pp. 145–151.

Psoralea Castorea, Watson—*New Species*.—This plant grows in exposed sandy localities between Beaver-Dam, Arizona, and St. Thomas, Nevada. The large, tuberous roots are very white and farinaceous, and are eaten by the Pah-Ute Indians raw or cooked in hot ashes, or ground up and made into bread and mush. The small tuberous roots of

P. Mephitica, Watson, new species, are also eaten and prepared like the first-named species. The plant is abundant in the low places between the hills southeast from St. George, Southern Utah, and the Pah-Utes resort there to collect its roots. The leaves have a very disagreeable smell.

The roots of carrots, potatoes, beets, turnips, and parsnips are eaten by the Pah-Utes, who have acquired a taste for the tubers of these plants, and they consume them in great quantities, either raw or cooked, without being cleaned. They place them in hot ashes, and devour them when cooked, skins, dirt, and all. When

* This paper is to be continued.

boiled, not only are the tubers eaten, but the water in which they were boiled is drank.—Dr. E. Palmer, A. J. Ph., November, 1878.

Licorice-root—Analysis.—F. Sestini has subjected licorice-root to analysis, with the following results :

	Fresh.	Dried at 110° C.
Water,	48.700	
Fat, resin, coloring matter (soluble in ether),	1.650	8.220
Glycyrrhizin,	8.271	6.878
Starch, etc.,	29.620	57.720
Cellulose,	10.150	19.790
Proteid matter,	8.267	6.878
Ammonia (present as salts),	0.022	0.048
Asparagin (calculated from nitrogen in excess of ammonia and proteids),	1.240	2.416
Ash,	2.080	4.060

The extract of licorice usually contains 7–8.5 per cent. of ash, and 15.5 to 17.5 of water. The fresh root, completely exhausted with water, and the extract dried at 100° C., gave :

Water,	48.7
Extract dried at 100° C.,	25.4
Insoluble residue dried at 100° C.,	25.9

In practice it takes about 5 parts of the root to yield one of the extract, which, moreover, usually contains 15 per cent. water.—Gazz. Chim. Italiana, viii, 131–137; in J. Chem. Soc., September, 1878, p. 740.

Oxytropis Lamberti—Partial Analysis of the Root.—Miss Catharine M. Watson has identified some specimens of weed called “crazy-weed” in Southern Colorado, to be *Oxytropis Lamberti*, and has subjected the root of the same to a partial analysis. The weed is said to have a peculiar effect upon horses and cattle that may acquire a taste for it, the symptoms resembling founder, paralysis of the nervous system, and ending in death. The Mexicans sometimes use the plant in making beer, and its effects upon man seem to be about the same as upon animals. The fresh root is described by Miss Watson as follows: It is externally yellowish-brown, very flexible and tough, and may be easily torn in fibrous strings. The transverse sections show a thick, whitish bark surrounding a bright yellow woody column. Its odor is peculiar and disagreeable; its taste sweet, resembling that of green peas. Under the microscope, from the outside towards the

centre, the tissues appear as follows: The epidermis, consisting of two rows of tabular weathered brownish cells, a broad zone of parenchyma, interrupted by wedges of liber fibre, which have their bases towards the axis of the root or against the bases of the wedges, which make up the woody column of the root. The elongated fibres are partly united into liber bundles, and partly formed into a network, making a very loose and open structure. Occasionally masses of resin are found occupying three or four absorbed cells. The wood is traversed by numerous medullary rays, which have the same structure as those of the bark. The vessels are grouped together in bundles of from three to five, and branch and anastomose, forming a network like that of the liber. The cells of the wood parenchyma, as well as those of the bark, are thin-walled, and nearly cubical in shape. Some needle-shaped crystals of calcic oxalate were found in the cells surrounding the liber. Solution of iodine imparts an orange hue to the whole root, proving the absence of starch.

The chemical examination gave evidence of the presence of an alkaloid, and a resin, the characters of which are partially described, was separated; but further and final experiments were prevented by Miss Watson's death.—A. J. Ph., December, 1878, p. 565.

Astragalus—*Poisonous Species*.—Dr. H. Gibbons, Sen., having drawn attention to the poisonous character of a plant which he names *crotalaria*, and which is known in California as *rattle-weed* or *loco-weed*; Professor J. M. Maisch draws attention to the fact that no species of the genus *Crotalaria* are found in California, although there are several species natives of Mexico. According to Professor Asa Gray, the *rattle-weed* of California belongs to the genus *Astragalus*, and it seems probable that the plant described by Dr. Gibbons likewise belongs to this genus. In view of the observations of the latter, Professor Maisch gives a description of *Astragalus crotalarix*, Gray, which is most likely Dr. Gibbons's plant, and of *A. mollissimus*, Torr. The former is found in the hills and plains from around San Francisco Bay to Santa Barbara; a variety, *virgatus*, Gray, being also found near San Francisco Bay. *A. mollissimus* is widely distributed west of the Mississippi, and has been found from Nebraska to Western Texas; it is rare in Colorado, and is not mentioned as occurring in California.

There are about 12 species of *Astragalus* found in the United

States east of the Mississippi, and 100 or more westward to the Pacific Coast. The eastern species are properly known as *milk-vetch*, and, as far as the author could ascertain, are nowhere employed for medicinal or domestic purposes. From the accounts given, however, it would seem that they deserve attention, at least so far as very active and even deleterious effects have been noticed from a few species of a large genus, which seems to produce mostly plants of little or no importance in a medicinal point of view.—A. J. Ph., May, 1879, pp. 237–240.

Sarcocolla Gum—Botanical Source.—The original packages of gum sarcocolla, which is imported into Bombay from the Persian port of Bushire in bags containing about two hundredweight, and apparently in considerable quantities, contains always certain portions of the plant, which Mr. W. Dymock has examined and believes to belong to a species of *Astragalus*. The following is a description of the parts of the plant found:

Fruit.—Pedicels short, slender; calyx three-quarters of an inch long, tubular-campanulate, chaffy; mouth narrow, five dentate; it entirely incloses the remains of a papilionaceous flower, and an ovoid rostrated pod as large as a grain of rice, the external surface of which is covered with a felting of white, cotton-like down, consisting of long simple hairs matted together. Although the pod is mature, the remains of the flower continue firmly attached, even after maceration in water. The pod is two-valved; attached to its dorsal suture on one side is a single grayish-brown, vetch-like seed, having a diameter of one-eighth of an inch; when soaked in water it swells, bursts, and a mass of sarcocolla protrudes; some of the pods are abortive, and contain grains of gum.

Stem woody, composed of numerous radiating, wedge-shaped bundles, thorny; thorns three-quarters of an inch long, and, together with the young branches, more or less covered with cotton-like down, and incrusted with sarcocolla.

Leaves, not found.

As leaves are never met with, it is probable that the sarcocolla is collected by beating the bushes after the leaves have fallen. The exudation must be abundant, as masses of sand glued together with it, of large size, occur in the packages.

Meer Muhammad Husain, in his *Makhzan-ul-adioiga*, states that “unzeroot” (sarcocolla) is the gum of a thorny tree called

"sháyakeh," which is about six feet high, has leaves like those of the frankincense (pinnate), and is a native of Persia and Turkistan. The Bombay commercial name is "Gūjār."—Ph. J. Trans., March 8th, 1878, p. 736.

Lupinus Luteus—*Presence of Lupinin, a Glucoside*.—E. Schulze and J. Barbieri have isolated from the dried lupine a glucoside, which they have named *lupinin*. The new principle is with difficulty soluble in water, either cold or hot, and in alcohol; but it is readily dissolved by ammonia, with a deep-yellow color, and also in solutions of sodic or potassic hydrate. From such solutions it is precipitated unchanged by acids, forming a yellow microscopic-crystalline precipitate. By the continued action of alkalies, however, it appears to be entirely changed. Prolonged heating with dilute mineral acids splits it into a yellow product, which for want of material has not been completely studied, and into glucose.

The composition of lupinin corresponds to the formula $C_{29}H_{32}O_{16}$. It was isolated from the vegetable by digestion with alcohol of 50 per cent., precipitating the tincture with solution of subacetate of lead, collecting the precipitate, decomposing it with sulphhydric acid, heating with a large quantity of water, and allowing the solution to cool, when the glucoside will crystallize out in the form of yellowish-white minute crystals. The decomposition product has been named *lupigenin*. Its composition corresponds to the formula $C_{17}H_{12}O_6$, and its production is assumed to result according to the following equation: $C_{29}H_{32}O_{16} + 2H_2O = C_{17}H_{12}O_6 + 2C_6H_{12}O_6$.—Ph. Centralb., May 1st, 1879, p. 179; from Ber. d. d. Ch. Ges., 1879.

Malabar Kino—*Characters and Separation of Kinoïn*.—C. Etti states that the peculiar principle, kinoïn, present in Malabar kino, may be readily extracted by ether or by boiling with diluted hydrochloric acid, and forms colorless prismatic crystals, which have the composition $C_{14}H_{12}O_6$. Kinoïn gives a red reaction with salts of iron, and when heated in a sealed tube to $120^{\circ} C.$ ($= 248^{\circ} F.$) with hydrochloric acid it is resolved into chloride of methyl, pyrocatechin, and gallic acid, the latter having a higher melting-point than ordinary gallic acid but otherwise all its reactions. This peculiarity will be the subject of further study. By heating kinoïn it gives off water and yields an anhydride, which is identical with the tannin of kino—kinored. By further heat

more water is given off and a second anhydride is formed. Distilled by itself kinoïn yields mainly phenol and pyrocatechin.—Ph. Centralh., January 9th, 1878, p. 13.

Copaifera Langsdorffii.—Professor Flückiger draws attention to the incorrect spelling of the word “Langsdorffii,” advocated by Professors Bentley and Trimen in their “Medicinal Plants.” These gentlemen recommend to omit the *g* and to write *Copaifera Lansdorffii*. The name *C. Langsdorffii* was given by Desfontaines in the “Mémoires du Muséum d'Histoire Naturelle,” tome vii (1821), 373, to the copaiba tree which had been sent to him by Baron George Heinrich von Langsdorff, a distinguished traveller and botanist, then consul-general of Russia at Rio de Janeiro. Desfontaines added a good figure to his description of that new species, which he lettered *Copaifera Langsdorffii*; in the same paper, however, this name is given differently, viz., *Lansdorf* and *Lansdorff*, an error which is probably due to the carelessness of some Paris printer.—Ph. J. Trans., March 22d, 1879, p. 773.

Copaiba—Collection in the Amazon Valley.—Mr. Robert Cross, in his report on the collection, etc., of Para and Ceara rubbers (which see), gives some interesting points connected with the distribution and collection of copaiba in the Valley of the Amazon. The finest sort known in commerce, and called by the collectors white copaiba, is met with in the province of Para, and is shipped from Para and Maranhão. Very large quantities are annually sent to the French market. Formerly the trees might be seen growing within easy access, but, owing to the method of collection practiced, it is now comparatively rare. At present a collector must make a journey of several weeks in a canoe up some of the Amazon tributaries, or penetrate into the dense forest lying between the rivers, to find any considerable quantity of copaiba, and the life of a balsam collector is said to be one of the most wretched description; but then a collector can earn, when the trees are abundant, as much as £5 per day. The trees grow to a great height, running up to fifty or sixty feet before branching, but no seedlings or young plants are to be found in the forests, for so soon as the seeds fall they are greedily devoured by a small animal about the size of a rat. To collect the balsam a hole or chamber, about a foot square, is cut in the trunk at about two feet above the ground. The wood is white to a depth of four or five inches, after which it is of a purplish-red color; indeed, the wood of all the species of *Copaifera* have this peculiar

tint. When the centre of the tree is reached by the axe the balsam flows out in a current full of hundreds of little white pearly bubbles. "At times the flow stopped for several minutes, when a singular gurgling noise was heard, after which followed a rush of balsam. When coming most abundantly a pint jug would have been filled in the space of one minute." Every particle of the wood appears to be charged with the liquid, though the bark appears to possess none. A large tree, in good condition, is estimated to yield about eighty-four English imperial pints. Mr. Cross refutes the stories told by travellers, that the balsam is collected by gashing the bark and plugging the space with cotton to absorb the juice which exudes, or that of closing cavities, made in the trunk, with wax or clay to allow the balsam to accumulate, and then opening them and extracting the collected balsam. Both systems, he considers, would be practically useless. Little or no care seems to be taken to preserve the balsam pure. Old jars and barrels, that have previously contained grease or liquors of all descriptions, and old paraffin cans, are very much sought after, and are used without being properly cleaned.

Regarding the proposed introduction of the plant in India, Mr. Cross observes that he would not recommend the planting of these trees on a large scale with a view to early profit, as a return would not be realized sooner than in the case with oak plantations. Wet or moist soil should be avoided, and the plants should be put in the best dry loam, such as is suitable for cane or coffee planting; seedlings may be planted tolerably thick, so as to shoot up rapidly, when they could be thinned out to proper distances.—Ph. J. Trans., August 3d, 1879.

Miscible Copaiba.—Some years ago Mr. Henry Groves (now of Florence, Italy) discovered the interesting fact that when a mixture of copaiba and "oil of tartar" (a saturated solution of carbonate of potassium)* are shaken together and thereby emulsified, the creamy fluid after standing a few days deposits a white crystalline substance, leaving supernatant a clear stratum of apparently unaltered copaiba. This was, however, found to be more or less completely saponified and rendered miscible with water, forming a white emulsion. Mr. T. B. Groves, the brother of the above named, has now made some experiments to deter-

* Mr. Groves states that a fluid drachm contains 84 grains carbonate of potassium.

mine the nature of the reaction. A sample of this miscible copaiba (copaiba, Oj; ol. tartari, fl. Zij), some six or seven years old, presented the following characters: It was similar in appearance to ordinary copaiba, but had an alkaline reaction, and when shaken with water it readily formed with it a white emulsion, more or less stable according to the degree of dilution. It differed little from ordinary copaiba in its behavior to solvents. Alcohol, however, did not effect a perfectly clear solution, and caused after a few days a minute whitish deposit, the removal of which does not appear to affect the emulsibility of the copaiba. The underlying crystalline deposit, spoken of above, was found to be imbedded in a pasty resinous substance, and proved to be bicarbonate of potassium. The action, therefore, of the acid resins of copaiba has been to deprive two molecules of the carbonate of half their potassium, leaving the second atom to combine with both atoms of carbonic acid, no evolution of gas attending the operation; the sample of copaiba used for preparing the miscible copaiba under consideration being presumably the Maranham variety. Experiments were made with a fresh quantity of Maranham copaiba, Para copaiba, and Gurjun balsam. Of these the Maranham copaiba alone gave similar results to that which had been used in the first experiment, but it was found that to prepare a perfectly miscible copaiba the oil of tartar must be added in proportion to the acid resins present. Neither Para copaiba nor Gurjun balsam produced a miscible article; and though a clear layer and crystals of bicarbonate of potassium were formed in the case of Para copaiba, neither layer was emulsible, though the lower (turbid) layer showed some tendency that way. From this peculiar behavior of Para copaiba the author is inclined to regard the Maranham variety as a "balsam," and the Para variety as a "balsam plus essential oil."

Mr. Groves recommends the miscible copaiba for administration in capsules, believing that its miscibility gives it advantages over the ordinary article.—Yearbook of Pharm., 1878, p. 527.

Balsamum Antarthriticum Indicum.—Under this name an East Indian drug, resembling Gurjun balsam, has lately been brought to notice on account of its reputed value against rheumatism and arthritis. It is said to be the exudation of a tropical Leguminosa, obtained by cutting cavities into the trees and allowing the juices to collect. At the instance of the firm through whose agency the so-called balsam is at present introduced into German

commerce, Mr. B. Hirsch has undertaken a comparative examination of the new drug, in the expectation to find some relation between it and Gurjun balsam. The results of this examination are quite interesting, but are yet incomplete. They show, however, that there is no relation between this "balsam" and Gurjun balsam, and that it is in all probability a compound of various resinous acids with an indifferent oily body. The crude "balsam," examined by the author, constitutes a turbid, brownish liquid, having the consistence of castor oil, and a sp. gr. of 1.010. The odor is that of common olive oil to which oil of rosemary has been added; its taste is at first mild and oily, then becoming unpleasant, acrid, and rancid. By heating it loses moisture, which causes the turbidity mentioned, deposits a small quantity of dark matter, and then forms the perfectly clear commercial article—the sp. gr. being now 1.016. The deposit, examined under the microscope, proved to be fragmentary portions of cellular tissue. It contains no volatile oil, but yields an acid distillate, the acidity of which is due to valerianic acid. Water takes up very little besides this acid; it is readily dissolved in an equal quantity of commercial absolute alcohol ($98\frac{1}{2}^{\circ}$), but is much less soluble in alcohol of 0.832 (90°). It is freely soluble in ether, chloroform, bisulphide of carbon, petroleum ether, olive oil, and benzin. These solubilities, however, refer to the clarified "balsam."—Arch. f. Ph., November, 1878, pp. 433–445.

Algarobia Glandulosa (or *Prosopis Juliflora*).—The fruit of the plant is the leading article of diet with the Utah, New Mexico, California, and Arizona Indians. It is gathered and housed with great care. Last winter Dr. Palmer watched the process of converting the seed-pods of this plant into bread. A female squatted herself on the ground by a wooden mortar, the lower end of which was some distance in the ground. With a long stone pestle she pounded the hard seed-pods into meal. She then took from her head a small conical hat and sprinkled a little water on the inside, and then a little meal, alternately, until the hat or bread-tray was filled. After being patted on the top, it was set on the ground and exposed to the direct rays of the sun for some hours, or until it would turn out a solid cake or bread. So little water had been used that it seemed impossible that it should stick together, but possessing a large percentage of sugar little water was necessary. The rather chaffy-looking bread, not

unlike that made of corn-meal with the bran in it, is very sweet, and the Indians keep fat as long as it lasts.

The Indians have long been acquainted with the valuable properties of the gum, for they not only eat it but mix it with mud and cover their heads with it for two or three days. When washed off the hair of the oldest is not only jet black, but the unwelcome visitors that previously lodged therein are all dead. The leaves of the plant are used by the Indians of Southern California to give a blue color to their freshly tattooed faces. The spines of a species of cactus are used to puncture the skin, and the desired color is obtained by rubbing the moistened leaves on the markings.

The wood furnishes charcoal; and is also made into handsome furniture, the grain being very fine.—Dr. E. Palmer, A. J. Ph., November, 1878.

Mesquite.—In previous reports attention has already been drawn to the prospective value of the “Mesquite,” *Algarobia* (or *Prosopis*) *glandulosa*, as a source of a gum answering as a substitute for gum arabic. Much that is said in the paper of a writer in a recent number of the “Scientific American” (August 31st, 1878, A. J. Ph., October, 1878, p. 480) is not absolutely new, yet some of the information given deserves notice in the present report.

There are several species of mesquite, but the one under consideration,

Prosopis glandulosa, has the widest range, being found as far north as the Canada River, and extending south into Mexico. It appears in Texas not far from the coast, and is the most abundant tree as far west as the Colorado and Gulf of California, proving most useful to travellers as fuel and forage. The tree grows to a height of thirty to forty feet, has a rounded head, and bears, in its general aspect, a great resemblance to the common honeylocust (*Gleditchia*); its leaves are twice-pinnate, the leaflets narrow, somewhat curved, and an inch or more in length; the flowers small, greenish-yellow, and crowded in dense axillary spikes; the pod or bean is from six to nine inches in length, curved or straight, flattened, and constricted between the seeds. They ripen in June, contain a sugary pulp, having an agreeable blending of sweetness and acidity, and serve as food for horses as well as for the Indians living within its reach, and by these are gathered, dried, and stored for winter use.

The gum, which has been shown to resemble gum arabic very closely in its composition and chemical properties, exudes spontaneously, concreting in tears and lumps of various size and color, from pale yellow to dark amber; it is quite brittle, and its fractures show a brilliant surface. The exudations of a single tree vary from an ounce to three pounds, but doubtless much more would be yielded were incisions made into the bark. The branches are said to furnish a purer quality than the trunk. As the mesquite trees abound upon the plains over regions thousands of miles in extent, and flourish luxuriantly in dry and elevated situations, the gum must, in course of time, become an important article when the facilities for gathering it become more perfect.

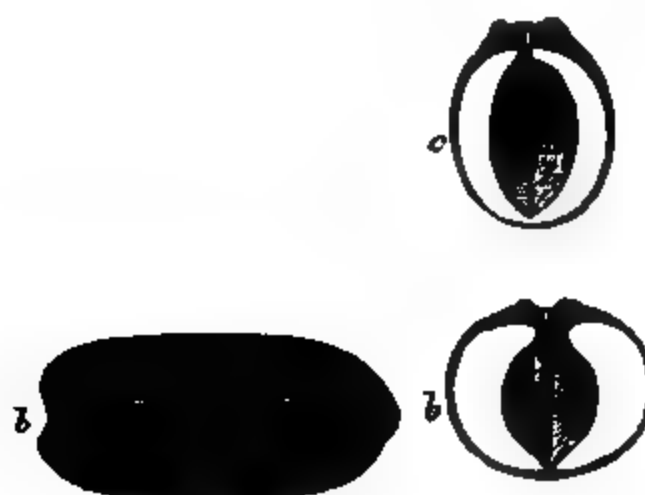
Calabar Beans.—Mr. E. M. Holmes has observed among the Calabar beans of commerce the occurrence of some specimens which are longer and more cylindrical, and mostly of a redder tint than those generally met with. Hitherto only one species of the genus *Physostigma* has been described, but the author's attention being drawn by Mr. Carruthers to what he believed to be a second species in the Welwitsch collection in the British Museum, which had been described in Oliver's "Flora of Tropical Africa" under the name of *Mucuna cylindrosperma*, Welw., he compared the cylindrical beans of commerce with those of the latter and found them to be identical. The pods of the two plants on comparison were found to be extremely similar, both having a smooth outer layer, or epicarp, marked with numerous oblique chinks or fissures, about half an inch long, a friable mesocarp, which easily decays and leaves only the veins distinctly visible, and a minutely tuberculated endocarp. The inside of the pod is lined with loose cellular tissue, which looks almost like a very thin layer of wool. The leaves of the two plants are also very similar, being composed of three stalked leaflets, of which the two lateral ones are unequal-sided, the side next the centre leaflet being the narrowest. Welwitsch's description so closely tallies with that of the true Calabar bean that were it not for the difference in the stipules—which in the *Mucuna cylindrosperma* are said to be reflexed and persistent, while in *Physostigma venenosum* they are stated to be deciduous—it would be impossible to distinguish between them. Until flowers and further specimens of the two plants are procurable it will be doubtful whether *Mucuna cylindrosperma*, Welw., is more than a variety of *Physostigma venenosum*, Balf.; but until then it should evidently be

placed in the genus *Physostigma*, under the name of *P. cylindrospermum*. The question of identity is also one of pharmaceutical interest, since A. Petit has found considerable variation in the yield of eserina from different samples of Calabar beans, and Mr. Holmes has now also made it probable that this variation is due to the different sources of the beans. Knowing that eserina is easily decomposed by alkalis with a reddish coloration, a rough test was made by applying liquor potassæ to the cotyledon. In the case of true Calabar bean a permanent pale-yellow tint was produced, while the cylindrical ones, as well as those collected by Welwitsch, gave a deep almost orange color, ultimately turning to a greenish hue, thus apparently indicating greater activity than the ordinary kind. The actual yield of eserina in the two sorts of Calabar bean is now under investigation. The two sorts are shown in the illustration, Figs. 44, Nos. 1 and 2:

FIG. 44.

Nº 1.

Nº 2.

*Physostigma venenosum* and *P. cylindrica*.

Physostigma Venenosum.—No. 1: *a*, showing shape of seed; *b*, showing the length of hilum; *c*, transverse section, showing cavity between the cotyledons. The color is mostly very dark, purplish-brown, or nearly black. The hilum extends the whole length of the bean, so that neither end of it is visible when the hilum faces the eye, and fragments of the funiculus often remain attached as a whitish line to the edges of the hilum. The seed is also broadest in the middle and tapering towards the ends, and is somewhat flattened at the sides. This character is most easily seen by transverse section *c*.

Physostigma Cylandrospermum.—No. 2: *a*, showing relative length of hilum; *b*, transverse section, showing different shape of bean. The seeds are longer than those of the Calabar bean, nearly cylindrical, of a reddish-brown color, with few exceptions of a darker hue, and the hilum does not extend quite to the extremity of the bean at the end where the micropyle is visible, but forms there a slight projection, or, when the projection is not marked, a portion of the bean about a quarter of an inch in length may be distinctly seen beyond it at the end. These characters distinguish the two seeds sufficiently for practical purposes.—Ph. J. Trans., May 10th, 1879, p. 913.

Calabar Beans—Presence of a Cholesterin-like Body.—O. Hesse has obtained from Calabar beans a new body which he has named

Physosterin, and which seems to be identical with Kolbe's "cholesterin from peas." When powdered Calabar beans are extracted with petroleum-ether and the solution is evaporated, an oily residue is left, which, after a time, solidifies to a butyraceous mass. On pressing this between bibulous paper to remove the oil, dissolving the residue in hot alcohol, and recrystallizing from ether and alcohol successively, brilliant, colorless, tabular crystals are obtained, which melt at 132° – 133° C. ($=269.6^{\circ}$ – 271.4° F.), and give numbers on analysis agreeing with the formula $C_{28}H_{44}O$, H_2O . By recrystallization from petroleum-ether the substance is obtained in needles which contain no water of crystallization. Cholesterin from gallstones has the composition $C_{25}H_{42}O$, and melts at 145° – 146° C. ($=293^{\circ}$ – 294.8° F.). The author is inclined to regard cholesterin as the next lower homologue of physosterin, and believes that the two substances occur together in the animal kingdom.—Liebig's Annal., 192, pp. 175–179; in J. Chem. Soc., November, 1878, p. 850.

Alhagi Maurorum, De C.—The plant, *Jawasa* (Hind. and Bomb.), and the manna, *Taranjabin* (Pers. and Bomb.), are used medicinally in India. The plant is a low shrub, armed with copious subpatent, hard, pungent spines, $\frac{1}{2}$ –1 inch long. Leaves simple, drooping from the base of the spines or branches, oblong, obtuse, rigidly coriaceous, glabrous. Flower, 1–6, from a spine on short pedicels; calyx glabrous $\frac{1}{2}$ – $\frac{1}{4}$ inch; corolla reddish, three times the calyx; pod 1 inch long or less, falcate or straight, constricted between the seeds; seeds kidney-shaped, greenish-gray, very

hard. The thorny flower-stalks and branches are described in Sanscrit works as being the parts used as laxative, diuretic, and expectorant. The Hindoos use the fresh juice as a diuretic, generally in combination with laxatives and aromatics. The manna,

Taranjabin, occurs in white grains or small agglutinated masses, mixed more or less with the thorns, pods, and leaves of the plant; it has hardly any odor, and the taste is saccharine and afterwards slightly acid. There is no mention in Sanscrit books of manna being obtained from the plant; indeed, none is produced upon it in India. Meer Muhammad Husain says that it is collected in Khorasan, Mawarunnahr, Kurjistan, and Hamadan, by cutting the plant and shaking it in a cloth to separate the manna; an inferior kind is made by dissolving what still adheres in water, and evaporating it to a suitable consistence. In Bombay, fine, clean white samples are obtainable during the season of import (November to January), but unless very carefully preserved, it soon spoils in the moist climates of the western coast, running together and becoming a brown, sticky mass.

The dried plant is always obtainable in Bombay under the name of jawasa. It is a native of the deserts of Egypt, Syria, Mesopotamia, Persia, and India, as far south as the Concon.—Professor Dymock, in Ph. J. Trans., August 24th, 1878, p. 145.

Apios Tuberosa.—This plant is common throughout the Northern and Southern States. It is known under the name of *Saga-ban* by the Miemacs, by whom the pear-shaped roots are used as an article of food. The tubers are about the size of cherries, and resemble common potatoes in taste and odor. The skin is rusty, or blackish-brown. They contain a large percentage of starch, which resembles that of wheat, and are very wholesome.—Dr. E. Palmer, A. J. Ph., November, 1878.

Dalea Emoryi—(*D. Polyadenia*).—The branches of this plant steeped in water form a bright yellowish-brown dye, and emit a strong, rue-like odor. The Coahuila Indians, of California, to ornament their baskets of a yellowish-brown color, steep their rushes in a dye of that color prepared from these *Daleas*.—Dr. E. Palmer, A. J. Ph., December, 1878.

TEREBINTHACEÆ.

Rhus Toxicodendron.—Dr. S. A. Brown, U. S. N., states that he has found in bromine a specific for the troublesome eruptions produced by poison-oak or poison-ivy, and that he has used it with unvarying success in at least forty cases. He uses the remedy dissolved in olive oil, cosmolin, or glycerin, in the strength of from 10 to 20 drops of bromine to the ounce of vehicle, and rubs the mixture gently on the affected part three or four times daily. The bromine is so volatile, that the mixture should be renewed within twenty-four hours from its preparation. The eruption never extends after the first thorough application, and it promptly disappears within twenty-four hours if the application is persisted in.—Drug. Circ., September, 1878, p. 154; from "Medical Record."

Rhus Aromatica, var. *Triloba* (*Squaw-berry*).—So named because the Indian women gather large quantities of the berries, which are used as food when dried; being very sour, they also make a pleasant, acidulous drink when fresh, which is much used during the summer months. The plant grows loosely in mountainous ravines, and attains a height of five to eight feet. The wood exhales a peculiar odor, which never leaves articles made from it, and which is always recognizable about Indian camps. The most useful application appears to be that of the young twigs, upon which the Indians in Utah, Arizona, Southern California, and New Mexico depend solely for material out of which to make their baskets. It is far more durable and tougher than the willow, which is not used by these Indians. The twigs are soaked in water to soften them, and to loosen the bark, which is scraped off by the females; they are then split by the use of the mouth and both hands. Their baskets are built up by a succession of small rolls of grass stems, over which these twigs are firmly and closely bound. A bone awl is used to make the holes under the rims of grass for the split twigs. Baskets thus made are very durable, will hold water, and are often used to cook in; hot stones being dropped in from time to time until the food is done. The red berries of

R. Integrifolia, which are produced very abundantly, are also very acid, and are used by the Indians of Southern California to

produce, with water, a cooling drink.—Dr. E. Palmer, A. J. Ph., November, 1878.

Myrrh.—Additional light has lately been thrown on the source of myrrh by a specimen brought back from eastern tropical Africa by the successful German traveller, Hildebrandt. The specimen, a unique one, is preserved in the Royal Berlin Herbarium, and has been the subject of a short note by Hildebrandt, who refers it without doubt to *Balsamodendrum Myrrha*, Nees. The doubts and confusion prevailing in the whole genus *Balsamodendrum* are especially the attributes of this species, which in England, at all events, is only known by the insufficient figure and description of Nees. The publication of Hildebrandt's note, and the information given by him to Mr. Henry Trimen during a recent visit to London, have led the latter to again review the existing material, and by the kindness of the Royal Herbarium at Berlin, he has been favored with the loan of Ehrenberg's original specimens (which Mr. Hanbury endeavored but failed to get sight of); and with the unique specimens gathered by Hildebrandt. Mr. Trimen has also had the opportunity of seeing the living plants sent to the Royal Garden, Kew, by Mr. Wykeham Perry, a most interesting and valuable series, and accompanied with notes which he has been permitted to consult. Yet with all these advantages, Mr. Trimen considers the matter to be still far from solution, and that the conclusions at which he has arrived are but slight advances on what was previously known.

As to Ehrenberg's type specimens, Mr. Trimen observes that one sheet of *B. Ehrenbergianum* has attached to it the tickets of the collector relating to myrrh, which Berg printed, and Hanbury wished to see. They are correctly given (after Berg) in "Pharmacographia." The author agrees with Oliver in referring this plant to *B. Opobalsamum*, of which it does not deserve to rank even as a variety, an opinion which he had previously expressed in Bentley and Trimen's "Medicinal Plants" (tab. 59, part 8), and which is now strengthened. With reference to *B. Myrrha*, the specimens are poor ones, and the actual specimen figured by Nees does not appear to be among them. There are neither flowers nor fruits, and there is only one with a label of Ehrenberg's, which states that it was found "*ad mar. martio*," but has no word as to its affording myrrh. Mr. Trimen, therefore, considers it not impossible that those now attached to the sheet of *B. Ehrenbergianum* after all really refer to *B. Myrrha*.

From all the material at the author's command, he thinks it may safely be concluded that myrrh is obtained from *Balsamodendrum Myrrha*, and that the plant grows in Somaliland, and on the Red Sea coast of tropical Arabia. Whether it also occurs in Southern Arabia is less certain. As to the distinctness of *B. Myrrha*, Nees, as a species, there is no possibility of deciding until more complete specimens are forthcoming; meanwhile, he thinks it is well to maintain it. If kept up as a species, it will probably be found to stand intermediate between *B. Opobalsamum* and the Indian species *B. Mukul*, Hook., and *B. Berryi*, H. and A., with the latter of which it is even perhaps identical.—Ph. J. Trans., May 3d, 1879, p. 893.

Carya Tomentosa, Nuttall.—Mr. Frank R. Smith has succeeded in isolating a crystalline principle from hickory bark, which he states is identical with *quercitrin*, but which he proposes to name *caryin*. Tannin and sugar were also found; resin, gum, and starch were absent. The bark was collected by the author.—A. J. Ph., March, 1879, p. 118.

In a note to the above, the editor of "A. J. Ph." states that the crystalline principle presented by Mr. Smith, shows the usual reactions of *quercitrin* prepared from *Quercus tinctoria*, and when ignited, is decomposed without residue; it is, however, of a darker color, and has a decided greenish tint.

Icica—*Species*.—A resin received by Mr. E. M. Holmes, from Liberia, under the name of copal, is evidently a kind of Elemi, possibly identical with the African Elemi presented to the Museum of the Pharm. Society of Great Britain by the late Dr. Ure.

Liberian Elemi seems, externally, of very inferior quality, presenting a dirty, blackish appearance, the white, opaque, porous resin only showing here and there. The odor closely resembles that of Elemi; it is, however, very much drier and more friable than the ordinary specimens of that substance examined by Mr. E. Fielding; it proved to be a comparatively pure drug, being composed as follows:

Resin soluble in alcohol,	0.845
Resin soluble in ether,	0.120
Black insoluble residue,	0.035

The alcoholic solution is surprisingly pale in color, no darker in fact than a solution of sandarach of equal strength, which is

the more remarkable when the aspect of the crude material is considered. The black, insoluble residue (3 or 4 per cent., according to the above), contains potassium, and is almost free from sodium; and when examined under the microscope is shown to consist almost entirely of fungoid and algal filaments.—Ph. J. Trans., April 19th, 1879, p. 853.

PIPERACEÆ.

Pepper—Cultivation in Cochin China.—According to "Pharm. Zeitung," the cultivation of pepper in Cochin China is extending from year to year, particularly in the provinces of Hatien and Thudan-mot, from whence 800 tons of pepper were last year exported. The plantations, which are all owned by the Chinese, contain each about 50 hectares, each of which bears about 2500 pepper plants. These are generally propagated by seedlings, which are planted at the end of the rainy season (November and December). A good shrub produces, in favorable years, about 1 kilo of pepper. When fully developed, the pepper-shrub bears fruit for forty or fifty years without intermission. The pepper of Hatien, which is more gray than black, is preferred in France to that exported from Singapore, as the latter is mostly adulterated, and entails a loss of 10–12 per cent.—New Rem., February, 1879, p. 49.

RHAMNACEÆ.

Rhamnus Purshiana (Cascara Sagrada)—*Chemical and Microscopical Analysis of the Bark.*—Professor Albert B. Prescott communicates the result of a chemical and microscopical examination of the bark of *Rhamnus Purshiana*, furnished him by a respectable house as such, but not identified by him. It resembles the bark of *Rhamnus frangula* in its structure, but has distinct differences from the latter. Fig. 45 shows the structure in transverse section. Fig. 46 in longitudinal sections.

The *corky layer* (a) consists of the outer epidermis of dark-brown weathered cells, then several rows of cells filled with a dark-red coloring-matter (e), and in the more recent bark, a row or two of cells containing chlorophyll. The red color (e) is soluble in ether, alcohol, potassium hydrate solution (with a dark-brown color); insoluble in acetic acid. The *middle bark* (b) is made up of parenchymatose cells, which are filled with small starch-grains. These are visible, also, in the transverse section,

several groups of cubical crystals (*f*), and in the longitudinal section, groups of very thick-walled yellow cells (*k*). These cells (*k*) are not noticeably affected by the ordinary reagents. The

FIG. 45.

Rhamnus Purshiana. Transverse section of bark.

inner bark (*c*) consists principally of yellow medullary rays (*d*), separated by bast parenchyma (*g*), through which are scattered numerous yellow bast fibres (*h*). As seen in longitudinal section, these fibres (*h*) are frequently surrounded by small cubical crys-

FIG. 46.

d

d

Rhamnus Purshiana. Longitudinal section of bark.

tals (*f*). The crystals (*f*) appear not to be affected by hydrochloric acid. Almost the entire inner bark, and parts of the middle bark are turned cherry-red by contact with potassium hydrate solution.

The chemical constituents of the bark are: 1. A *brown resin*, strong bitter, colored vividly purple-red by potassium hydrate solution, sparingly soluble in water, freely in alcohol and dilute alcohol, scarcely at all in absolute ether, soluble (?) in chloroform, benzol (from coal-tar), and in carbon disulphide; soluble in caustic alkali, and precipitated from such solution by acids; colored blood red by sulphuric acid. 2. A *red resin*, nearly tasteless, colored rich brown by potassium hydrate solution, insoluble in water, soluble in alcohol and dilute alcohol, not freely soluble in ether, chloroform, or carbon disulphide; its alkaline solution is precipitated by acids; colored brown-red by sulphuric acid. 3. A *light-yellow resin or neutral body*, tasteless, colored bright red-brown by sulphuric acid, not colored by potassium hydrate solution, insoluble in water, sparingly in cold alcohol of 70 per cent., soluble in hot alcohol, chloroform, carbon disulphide, and to some extent, in coal-tar benzol. 4. A *crystallizable body*, obtained from absolute alcohol solution in white double pyramids, and some other forms of the dimetric system; melts and sublimes at a temperature a little above that of the water-bath; not appreciably soluble in ether, chloroform, or petroleum-ether; very slowly soluble in absolute alcohol, slightly in 70 per cent. alcohol, soluble in coal-tar benzol; neutral to test-paper; insoluble in potassium hydrate solution, acetic acid, or dilute sulphuric acid; not colored by potassium hydrate solution, concentrated sulphuric acid, nitric acid, Frøehde's reagent, or sulphuric acid followed by dichromate. 5. *Tannic acid*, giving a brownish-green color with ferric salts. 6. *Oxalic acid*. 7. *Malic acid*. 8. A *fat oil, of yellow color*. 9. A *volatile oil*, not abundant, bearing the characteristic odor of the bark. 10. *Wax*. 11. *Starch* in abundant quantity.

The light-yellow resin, or neutral body, and the crystalline principle deserve, in the author's opinion, further investigation, which he hopes to be able to give them. The latter may prove a product rather than an educt.—A. J. Ph., April, 1879, p. 165.

Rhamnus infectorius—*Examination of Buckthorn Berries*.—C. Liebermann and Hörmann have examined the glucoside extracted by alcohol from buckthorn berries, and have obtained some results differing from those arrived at by previous experimenters. The glucoside was first prepared pure by Gellatly, who called it *Xanthorhamnin*, the name adopted by the authors. It is identical with Schützenberger's *a*-rhamnegin. The properties of the substance, as described by these chemists, agree with the obser-

vations of the authors. Xanthorhamnin does not ferment with yeast. When boiled with dilute sulphuric acid it readily breaks up into "rhamnetin," which deposits in tufts of lemon-yellow needles, agreeing in composition with Schützenberger's formula, $C_{12}H_{20}O_5$,—and into

Rhamnodule.—This the author finds to be (contrary to the observations of Gellatly and Schützenberger) a crystallizable sugar. It is soluble in water and absolute alcohol, and crystallizes from the latter in hemihedral tables. The aqueous solution yields holohedral crystals, which melt at 92° – 93° C. ($=197.6^{\circ}$ – 199.4° F.). Dried in the air the sugar has the formula $C_6H_{14}O_6$. When heated it melts, and at 108° C. ($=226.4^{\circ}$ F.) gives off one molecule of water; the residual $C_6H_{12}O_5$ solidifies on cooling to a glassy mass, the aqueous solution of which yields crystalline sugar. Rhamnodule is very sweet and agreeable in taste. It does not ferment with yeast. Its action on polarized light is dextrorotatory. It reduces Fehling's solution on warming. Xanthorhamnin yields about 57 per cent. of it.—Ph. J. Trans., May 10th, 1879, p. 916; from Ber. d. d. Ch. Ges., 11, pp. 952–958.

CELASTRACEÆ.

Wahoo Bark—Proximate Analysis.—Mr. J. J. Miller has obtained, or recognized, the presence of albumen, starch, gum, wax, resins, fixed oil, glucose, *euonymin*, and *volatile oil*. The latter, which previous experimenters had failed to obtain, was obtained in small quantity by redistilling several times from chloride of sodium solution, then extracting the distillate with benzole, and evaporating the solution carefully. It had the odor of the drug, was clear, of brownish color, balsamic taste, neutral reaction, and evaporated very slowly on simple exposure to air. The

Euonymin was obtained very readily by Wenzell's process (A. J. Ph., 1862, p. 387), and the author gives some additional reactions. It is white, intensely bitter, odorless, uncrystallizable, slightly soluble in water, soluble in alcohol, in petroleum, slightly soluble in ether, insoluble in benzole (of coal tar), and in carbon disulphite. In dilute sulphuric acid it dissolves colorless; conc. sulph. acid yellow, then red brown; nitric and hydrochloric acid, yellow solution. From its alcoholic solution: iodine solution with potassium iodide gives a brownish-red, potassium mercuric iodide a white, sodium phosphomolybdate a green-yellow, tannic acid a slight white precipitate, and picric acid a precipitate only on long

standing. Its solution in dilute sulphuric acid is also precipitated green-yellow by sodium phosphomolybdate, which, by ammonia, is changed to a blue solution, which fades on boiling.—A. J. Ph., December, 1878, p. 563.

EUPHORBIACEÆ.

Euphorbia Polycarpa (*Golendrina* of the Mexicans).—The Indians of Arizona and Southern California rely upon a decoction of this plant as a cure for snake-bites, and many cures effected by its application are reported. Dr. Palmer relates his own experience with the remedy. Wading in the salt water near San Diego, a fish (*Sting Ray*) plunged the bony projection at the base of its tail into his left foot, and soon the swelling and pain became excessive. A Mexican woman made several gallons of a very strong decoction from this plant, and plunging his leg up to the knee into it while hot relief came in a few hours.—Dr. E. Palmer, A. J. Ph., December, 1878.

Spurge Euphorbia.—According to Professor X. Landerer, the employment of euphorbia for stupefying fish is practiced by the fishermen of Greece, who place bunches of the plant into shallow bays along the seacoast, which enables them to catch the fish with their hands. These fish, which are called *phlomiasmena psaria*, soon begin to putrefy, and when eaten cause diarrhœa and vomiting. The practice is, on this account, forbidden in Greece under heavy penalties. The species which occur commonly are: *E. helioscopia*, *E. peplis*, and *E. dendroides*, which latter attains the size of a small tree or shrub, and from the branches and leaves of which a poisonous gum exudes. Formerly all the country people in the Osmanic Empire were compelled by law to destroy, during the month of April, all poisonous plants growing in their neighborhood, such as Euphorbia, Cicuta, Hyoscyamus, Datura. This law was strictly obeyed up to 1833–34, but since then has remained a dead letter. Another species often found is *E. apios*, the pear-shaped root of which was used as a strong cathartic by the shepherds. These plants are also known by the name *galatzidæ*, from *gala*, milk.—New Rem., October, 1878, p. 297.

Castor Oil Plant—Cultivation in Illinois.—St. Clair County is largely engaged in the cultivation of the castor oil bean. It is said that thirty thousand gallons of this oil is its usual product. About twenty bushels of the bean is the yield of an acre. The

crop is planted much like that of Indian corn; only one bean, however, is dropped in each hill. Belleville, the county town of St. Clair, within fourteen miles of St. Louis, is the centre of the bean district of that county, and a ready market for the article is found in St. Louis. The oil cake makes an excellent food for soil, and is much used in different parts of the country as a superior fertilizer for farming lands.—Drug. Circ., February, 1879, p. 52.

Anda Brasiliensis, Radde—*Properties and Uses of the Oil of Anda-seed*.—This tree is indigenous to Brazil. Its bark when incised, exudes a milky juice used for poisoning or stupefying fish. The fruit of the tree is over three inches in diameter, containing seeds of the size of a chestnut, which have a pleasant, almondlike taste, and contain a fixed oil, which is cathartic, and sometimes also acts as an emetic. One or two are sufficient to produce copious evacuation. In Brazil they have been used from ancient times for this purpose, generally triturated with sugar, cinnamon, and anise. The fixed oil, obtained by expression, has a pale-yellow color, is transparent, and almost tasteless. It is also used for anointing wounds. Dr. Norris has tried it in the Pennsylvania Hospital, and regards it as a prompt purgative in doses of 50 minims.

The editor of "New Remedies" observes that the fixed oil of anda has extraordinary drying properties, more so even than boiled linseed oil. The tree and the fruit are called in Brazil: Andaaçú, Indayuçu, Fructa da Arara, Purga de Gentio. Da Siloa Manso gives the dose of the oil at one-half scruple.

Synonyms for the plant are: *Anda Gomesii*, Jues, and *Johannesia princeps*, Velloz.—New Rem., June, 1879, p. 179; from Restaur. Farmacéutics.

URTICACEÆ.

Indian Hemp—*Nicotia a Component*.—Preobrachensky has found that nicotia is the chief active component of Indian hemp. 10 grams yielded by dry distillation 0.00381 gram, and with the aid of caustic potassa 0.056 gram of the alkaloid.—Ph. Centralh., December 26th, 1878, p. 494.

Hops—*Detection of Sulphurous Acid*.—Dr. G. C. Wittstein, after some general remarks on the utility of sulphurous acid for preserving hops, and the prejudice that still exists in some countries against hops treated with it, gives the following method for de-

termining its presence in them: 20 grams of the hops are introduced into a cylindrical glass vessel, with 100 grams of water. The hops are well immersed in the liquid, and the whole allowed to stand one day. The mass is then expressed strongly, the turbid liquor transferred to a glass flask, hydrochloric acid of sp. gr. 1.120 in equal volume and 5 grams of zinc are added, and the gas which is gradually evolved is passed into a clear solution of 1 p. acetate of lead in 30 p. of water, contained in a narrow glass cylinder about 10 centimeters high. With freshly sulphured hops a black deposit soon forms on the inner surface of the delivery-tube, and gradually black, flocculent sulphide of lead is deposited in the liquid; with old hops a quarter of an hour may pass before any deposit is evidenced in the delivery tube; if no such deposit is formed in half an hour the hops may be regarded as not having been sulphured. The method is dependent on the liberation of the sulphurous acid from the hops by the strong mineral acid, and its conversion into sulphhydric acid by the action of the hydrogen.

In the author's opinion the sulphurous acid is present in sulphured hops combined with some of the hop components that would without its presence soon decompose, and which it preserves perfectly. During the boiling of such hops in the beer-wort, this sulphurous acid, being liberated by the free acids (lactic and phosphoric) present, is entirely dissipated; hence the presence of the sulphurous acid in the hops does not in any way act injuriously on the quality of the beer; and for this reason, also, sulphurous acid in the finished beer is not present from this source. Latterly, however, bisulphite of calcium has been used to a considerable extent for the preservation of beer, and any sulphurous acid present in beer is attributable to this source. The only possible danger from sulphured hops may be the presence of arsenic, introduced as impurity of the sulphur. That used for the sulphuring process should therefore be free from this poison.—Ph. Centralb., August 22d, 1878, p. 313.

Ficus Gummiiflua—*Examination of Wax*.—Mr. F. Kessel has examined the wax obtained from this plant in Java, which is used by the natives of certain districts for illuminating purposes. It is of a chocolate-brown color, which it loses on treatment with boiling water, becoming almost white. It then consists of two nodules, which are separated by taking advantage of the difference of their solubility in ether. The more difficultly soluble

constitutes about $\frac{1}{20}$ th of the crude material, melts at 62° C. ($= 143.6^{\circ}$ F.), and has the empirical formula, $C_{27}H_{56}O$. It reacts with pentachloride of phosphorus to form a chloride which is not decomposed by water, and with acetic chloride to form a crystalline acetate, melting at 57° C. ($= 132.8^{\circ}$ F.). It therefore contains an OH group, and is probably an isomeride of ceryl alcohol. The more easily soluble, on the other hand, melts at 73° C. ($= 163.4^{\circ}$ F.), and has the composition, $C_{15}H_{30}O$. It reacts with chloride of phosphorus and acetic chloride. The purified wax yields on dry distillation a crystalline body, which separates from its solution in petroleum in pearly scales; it melts at 62° C. ($= 143.6^{\circ}$ F.), and boils at 345° – 354° C. ($= 653^{\circ}$ – 669° F.); its composition is represented by the empirical formula, $C_6H_{12}O$. It yields a crystalline acetate, melting at 57° C. ($= 132.8^{\circ}$ F.)—Ph. J. Trans., March 15th, 1879, p. 758; from Ber. d. d. Ch. Ges.

New Sources of Rubber.—In his annual report the director of Kew Gardens (England), after detailing the experiments made on the propagation of Para and Ceara rubber plants in India, Ceylon, Mauritius, etc., some of which have been quite favorable, gives some interesting information regarding new sources of india-rubber. A creeping Burmese plant—

Chavannesia esculenta, mention of which as a source of rubber has been made as far back as 1860, and again in 1874 was the subject of a pamphlet, is mentioned also in this report. From Fiji samples of rubber have been received at Kew, which were reported as “a strong, elastic, pure rubber, of the same character as the higher grades of African rubber.” This rubber would seem to be the produce of a plant closely allied to *Tabernæmontana pacifica*, or from *Alstonia plumosa*. Regarding the rubber-producing plants of the East and West coasts of Africa, which are referred to a species of *Landolphia*, also belonging, as do the preceding, to the *Apocynaceæ*, the director reports that, “being climbing plants, which ascend lofty trees, they could not be grown like other rubber-producing trees in independent plantations; but they would doubtless flourish in the jungles of any tropical countries.”—Drug. Circ., February, 1879, p. 54.

Para and Ceara Rubbers—Collection, etc.—A very interesting report on the subject of india-rubber yielding plants in their own native homes has recently been issued from the India office, which embraces the observations made by Mr. Robert Cross, who is well known for his labors in the cinchona forests of South America

and the subsequent introduction of the plants in India. Mr. Cross has made a number of trips to South America for the purpose of securing seeds or plants, or both, of the best rubber-producing trees, with a view to their introduction and propagation in India. From a copious abstract of his report in *Ph. Jour. Trans.* (August 3d, 1878, pp. 86-89), the following is noted: The province of Para, and the islands that are scattered over the lower portion of the Amazon, are described as the great field for caoutchouc collecting. A good deal of the rubber from the Rio Negro, Madeira, and other tributaries seems to come in the form of negro-head or sernamby, while that from the Para region is the finer kind of smoked biscuit rubber, to the preparation of which great care is given. It is indeed reported that the Para tree is a different variety; its milk leaves no very prominent stain on the hands or clothing, while the milk of some of the varieties of rubber of the Upper Amazon gives a black inklike mark to the hands and clothes of the collectors. Attention is drawn for the first time to a singular result of the repeated tapings of the rubber trees. The trunk of a large tree, in a state of decay, was found to be a swollen mass of warty protuberances up to a height of 10 or 12 feet, the cause of which is described as follows: The collector uses a small axelike instrument, an inch broad; at each stroke he cuts through the bark and into the wood for fully an inch. Hundreds of these are made into the trunk of each tree in the course of a few years, and cannot heal under any circumstances, but a layer of wood is formed over the injured part at the expense of the bark and general vitality of the tree. The newly formed wood is again cut into and splintered, and so the process is repeated on each successive layer until the trunk becomes merely a mass of twisted, wrinkled wood, with very thin insipid bark. In this condition hardly any milk flows from the cuts, and, although for years a few green leaves may continue to sprout from the points of the twigs, yet the tree may be considered dead, and, in fact, finally withers away. It is, therefore, the injury done to the wood and not overlapping which lessens the flow of milk, and ultimately causes the death of the tree. The cuts in the wood are of course unnecessary, since the milk is met with only in the bark. The healing-over process which afterwards takes place is similar to that seen where a branch has been lopped from the trunk. The wood is compact and rather hard, and for this reason the tree lives on

for a number of years, although cut and hacked every season; but the flow of milk becomes so lessened that many are practically abandoned for years before they die. After detailing some rough and ready experiments made with a view to proving the conditions under which the Para rubber plants may be best propagated, which prove that the tree delights in abundance of moisture and rich fertile deposits, Mr. Cross gives a very detailed description of the tapping of the trees, the collection of the milk, and the method of preparing the rubber. The caoutchouc collectors commence work at daybreak, ostensibly because the milk flows more freely in the early morning, but, probably, also because rain often falls about two or three o'clock in the afternoon, by which the milk would be spattered and lost. The collector first of all, at the beginning of the dry season, goes round and lays down at the base of each tree, according to size, from 3 to 4 or 8 to 12 small cups of burnt clay. The foot-paths leading from tree to tree are likewise cleared of sapling growths. On proceeding to his work he takes with him a small axe and a wicker basket containing a small-sized ball of well-wrought clay. He usually has, likewise, a bag for the waste chippings of rubber and for what may adhere to the bottoms of the cups. These promiscuous gatherings are termed "sernamby," and form the "negro-head" of the English market. The cups are sometimes round, but are often flat or slightly concave on one side, so that, with a small portion of clay, they may be easily stuck against the trunk of the tree. The contents of fifteen of these make one English imperial pint. When the collector arrives at a tree he strikes with his axe in an upward direction as high as he can reach, making a steep, upward, sloping cut across the trunk, which penetrates the bark and an inch or more into the wood, and is often fully an inch in breadth. A cup is next quickly fixed with clay against the trunk just beneath the cut. The milk, which is of dazzling whiteness, now begins to exude. At a distance of four or five inches, but at the same height, another cup is affixed, and so on until the trunk is completely encircled. The same operation is performed on other trees until the day's work is finished. The collectors vary much in the tact with which this work is performed, some using good clay and working neatly, collecting large quantities of pure milk, while others operate very indifferently and collect a milk which often contains clay and other impurities. The quantity of milk that

flows from the cuts varies. If the tree is large and has not previously been twice tapped the cup will for the most part be more than half full, and occasionally a few may be quite full; if the trees are much gnarled from previous tapplings only a tablespoonful or less may collect in them. On each succeeding day a similar operation is carried on, with the exception that the cups are placed six to eight inches lower down until the ground is reached. The collector then commences as high as he can reach and descends as before, taking care, however, to make cuts in distinct places from those previously made. When the produce of milk diminishes in long-wrought trees two or three cups are put on various parts of the trunk where the bark is thickest. Although many of the trees are large the quantity of milk obtained is surprisingly small. This is attributed to overlapping, but Mr. Cross thinks it is not possible to overlap a rubber tree if in the operation the wood is not injured. By the treatment at present pursued, however, the trees become probably permanently injured in two years. The particular season appears to have no influence on the quality of the rubber; during the wet season there is probably a greater flow of milk, but it is more dilute. The dry season is, in fact, most suitable for caoutchouc collecting. Mr. Cross describes two other methods of tapping, which are chiefly confined to the Upper Amazon and tributaries, the principles of which are similar to those explained.

With regard to the collection of the milk from the cups it is done by a man running from tree to tree with a large calabash, into which the contents of the cups are emptied. As he pours the milk out of the cup he draws his thumb or forefinger over the bottom to clean out some which would otherwise adhere, and places the cups in heaps at the base of the tree, to be again used next morning. Much time is lost by the collector in traversing the intricate muddy footpaths, and more than twice the quantity might be collected in a fourth of the time if the plantations were properly formed. To prepare the rubber the milk is put into a large flat earthen vessel; beside this are placed narrow-necked jars, about eighteen inches high and about twelve inches across the broader part; the bottoms are knocked out of these jars, they are raised from the ground on three small stones, fires are lighted in these bottomless jars, and the slight distance they are raised from the ground causes sufficient draft to promote their burning; the fires are fed by dropping pieces of wood

and a handful of palm-nuts alternately into the mouths of the jars, the aim being to cause a dense smoke to arise from the mouth of the jar. The mould on which the rubber is prepared resembles the paddle of a canoe, such being, indeed, frequently used at many places on the Amazon. A little soft clay having been rubbed on the paddle to prevent the rubber adhering, the operator holds the mould in one hand, while with the other he takes a small cup and pours two or three cups of milk over it. He turns it on edge for a few moments above the dish until the drops fall, then quickly places the flat side two inches above the jar's mouth, and moves it swiftly round so that the current of smoke may be equally distributed. The opposite side of the mould is treated in the same way. The coating of milk upon being held over the smoke immediately assumes a yellowish tinge, and although it appears to be firm, on being touched is found to be quite soft and juicy, like newly curdled cheese, and throwing off water profusely. When layer after layer has been repeated and the mass is of sufficient thickness it is laid down on a board to solidify, and in the morning is cut open along the edge on one side and the mould taken out. Biscuit rubber, when fresh, is often four or five inches thick. After being hung up to dry for a few days it is ready for market. The fact of burning palm-seeds (which are said to be those of *Euterpe edulis* and a species of *Attalea*) has given rise to the opinion always stated by travellers that the smoke produced by these burning nuts exercises some peculiar effect upon the milk by which it coagulates more instantly. After a careful examination of this matter, Mr. Cross expresses it as his conviction that the rapid coagulation of the milk is simply produced by the high temperature of the smoke, and that with a very strong current of heated air or a good pressure of steam from a pipe a similar result would be obtained. Indeed, he is of the opinion that a simple evaporation of the juice on a water-bath would produce an equally good rubber.

Regarding the Ceara rubber, Mr. Cross observes that this is now proved to be the product of *Manihot Glaziovii*, but the rubber is collected in a different manner. The outer surface of the bark is pared off to a height of four or five feet, the milk then exudes, trickles down in an irregular manner, falling, for the most part, on to large leaves that are laid about the base of the trunk to receive it; some, however, drops on the ground, and so often gathers with it dust and loose stones. After several days the juice be-

comes dry and solid, and is then pulled off and rolled up into balls, or put into bags in loose masses.—Ph. Jour. Trans., August 3d, 1878, pp. 86–89.

Brosimum Galactodendron, Don. (*Cow-tree*; *Galactodendron Ulile*, Kunth).—This interesting tree, which is found in rocky soils in Venezuela, Caracas, etc., contains in all of its parts a white, pleasantly odorous and tasting milky juice, which is used by the natives as a substitute for cows' milk. The juice exudes abundantly from incisions made into the stem, and contains a concrete fat, called

Galactin, from which the natives have prepared candles since, at least, one hundred years. Recently Boussingault has again drawn attention to this material for making candles, evidently regarding it as something new. It resembles wax, but is more brittle, and is known in European commerce under the name of "American Wax." Boussingault found the juice to contain 35.2 per cent. wax (galactin), 2.8 per cent. saccharine matter, 1.7 per cent. casein (or caseinlike substance, reminding of the vegetable fibrin found by Vauquelin in *Carica papaya*) and albumen, 0.5 per cent. ash, 58.0 per cent. water, and 1.8 per cent. undetermined substance.—Ph. Centralh., November 7th, 1878, p. 426.

SALICINEÆ.

Willow-bark—Some Constituents of the Leaves, Branches, and Morbid Excrescences.—Edward Johansson has made a series of interesting investigations to determine the components of the pathological formations produced by the stings of insects upon the leaves and small branches of various willows, and their relation to the substances found in the leaves and branches themselves. The quantities of these excrescences were quite limited, in some instances amounting only to a few grams, for which reason the author employed in each instance quantities of the leaves and branches of the willows upon which they were found corresponding to the weight of the excrescences collected. The substances were comminuted while fresh, extracted with distilled water on the steam-bath, the extraction concentrated somewhat, filtered, the filtrate shaken with ether to remove gallic acid, etc. The residual portion of the substance remaining after treatment with water was then extracted with alcohol. Aqueous, ethereal, and alcoholic extractions were then obtained which gave results, upon suitable treatment, the details of which are given in the author's

very lengthy paper. The results themselves are concisely given in the following:

Salix Alba.—The excrescences contained a quercitrin-like body, while the leaves contained none, or but the smallest traces.

Salix Viridis var. *Fragilis-alba*.—The excrescences, like those of *S. alba*, contain a quercitrin-like body, but the leaves also gave distinct evidence of the quercitrin-like body, and are, therefore, distinguished by this from those of *S. alba*.

Salix Fragilis-alba var. *Fragilior*.—The same quercitrin-like body is found both in the excrescences and the leaves, and is present in larger quantities than in *S. viridis* var. *fragilis-alba*.

Salix Fragilis var. *Vitellina*.—The results with this were essentially the same as regarded the morbid excrescences; owing to an accident the experiments with the leaves, etc., were not completed.

Salix, Species?—The quercitrin-like body was evident in the morbid excrescences of this not-determined species of willow more distinctly than in any of those previously examined. The reactions obtained with the liquids from the leaves and stems also point to this body, but the author does not feel justified to positively maintain its presence in them.—Arch. f. Pharm., August, 1878, pp. 103–130.

CUPULIFERÆ.

Quercus.—The acorns of various species are used as food by the Indians of Southern California, Arizona, etc.

Q. Emoryi.—Rather common in Arizona; yields, as well as other varieties in the same region, an abundance of food. In the Smithsonian collection at the Centennial Exhibition was a sample of sugar from the "mountain-oak," at McCloud's River, sent by L. Stone. The sugar, or mannalike substance, was in small irregular lumps, of a dull color and very brittle. In Southern California the beautiful evergreen oak,

Q. agrifolia, is very abundant. When deprived of its branches it will sprout again as freely as a willow. Its fruit is considered by the Indians superior to all other acorns, and the failure of the crop is a serious loss, and drives the Indians of that region to hunt up every kind of substitute. The food is prepared by first taking off the hulls of the acorns, which is done in a mortar by a few slight strokes; the kernels are then reduced to a very fine

meal, and this is subjected to the following treatment, whereby the bitter and astringent taste which all acorns possess, with few exceptions, is removed: A coarse flat basket or strainer is placed on a pile of gravel, with a drain underneath; rather fine gravel is now scattered over the bottom and up the sides of the strainer, and the meal laid thickly over this gravel. Water is added, little by little, until it ceases to pass of a yellowish tinge, when all the deleterious property has been removed. The meal is then removed by the hands as much as possible, after which water is poured over the remainder, so as to get the meal together, and it is then scooped up by the fingers, very little being wasted in the operation. The meal is cooked in two ways: First, by boiling in water, whereby a mush, not unlike yellow corn-meal mush in appearance and taste, is obtained. The second mode is to envelop the recently washed meal, formed into small balls, in green corn leaves, which are then placed in hot ashes, covered with more leaves and a sufficient layer of hot ashes to bake the cakes, which are considered extra nice by the Indians. Females not only gather and store the acorns, but perform all the work necessary to convert them into food.

Q. Undulata var. Pungens.—A dwarf, compact bush, and very prolific; produces a sweet fruit which is as pleasant as fresh chestnuts, and is considered a great delicacy by the Lower California Indians. The nuts are so ripe before they fall that nearly every one germinates while still in the cup.

Q. Chrysolepis.—The finest of Southern California evergreens, produces the largest acorn and cup, but, though much used as food, the nuts are not considered as good as some others. Finally,

Q. Sonomensis.—A common deciduous oak of the hills about Julian, Southern California; is very productive, and affords much choice Indian food.—Dr. E. Palmer, A. J. Ph., November, 1878.

Cork.—An interesting paper entitled "Cork, Corks, and Cork-screws," has been contributed by H. G. Glasspoole, from which the following may find place here:

The trees from which the cork-bark is obtained are *Quercus suber*, and its variety *Q. occidentalis*. The former grows plentifully in the South of France, Spain, Algeria, and in some parts of Italy; the latter is a native of the Atlantic side of France and

Portugal, where this tree grows to the greatest perfection, and to which countries we are indebted for the major part of our supply. The principal provinces in Portugal from which we receive our largest supply of cork are Alemtejo and Algarva, from whence it is generally imported (into England) as dunnage in ships laden with wine. The best white cork is grown in France. There are large forests of cork in the French colony of Algeria, particularly on an estate granted some time back by the Emperor Napoleon III to M. le duc de Montebello. The cork tree has been introduced in the Southern States of America, and might probably be grown there with profit. The cork tree bears a general resemblance to the broad-leaved kind of *Quercus ilex*, or evergreen oak, of which species some authors consider it only a variety. When the tree has arrived at a certain state of maturity, about twenty years,—some say earlier,—it periodically throws off its bark, after it has grown to a prodigious thickness, and begins to clothe itself with a new one. The bark thus cast off is very indifferent and of little commercial value; to prevent this the tree is not allowed to have its own way, but the bark is artificially removed by the following process:

In the months of July and August, when the sap flows plentifully, a circular incision is first made a few inches above the surface of the ground, then a similar circular cut round the trunk immediately under the main branches, care being taken not to penetrate the inner bark. The portion intervening between the two cuts is then slit down longitudinally in three or four places, which divides the bark into broad sheets or planks. The tree is now left for a time so that the moisture from the sap may dry, when the bark is removed from the stem more or less curved, according to the breadth and diameter of the tree. The instrument used for cutting and removing the bark from the stem is a sort of axe, the handle of which is flattened into a wedgelike shape at the extremity, which serves to raise the bark. The bark grows again, and the disbarking takes place regularly every eight, nine, or ten years, the quality of the bark improving with the increasing age of the tree, which may exist one hundred and fifty years or more, and is not in the slightest degree injured by the process. The bark of the first and second gathering is used for inferior purposes, after that it is suitable for corks. The sheets, layers, or tables of cork, as they are called, are now scraped on the outer surface to remove the coarser parts of the epidermis

and any epiphytes or other extraneous substance. They are then thrown into deep pits and covered with water to soften them, in order to be flattened by pressure under heavy stones, after which they are dried over a fire, being frequently turned during the process to prevent their returning to their original shape. Or, instead of this moist process, the bark is drawn flat by the sheets having their convex sides placed towards a fire. In time they are considerably charred by the heat; they are then turned and charred on the other side though in a less degree. This charring gives the material what the cork-cutters call nerve, and has also the effect of closing the pores of the cork, which otherwise would absorb moisture, and render it useless for the purpose of stoppers, etc. Too much burning destroys its elasticity, but if not sufficiently burnt it will not be firm enough for the operations of the cork-cutter's knife. The bark now undergoes a rough cleansing; it is then built up into large stacks until it is bought for exportation by the cork merchants and dealers.

Some account of cork-cutting and of the very varied uses to which cork is applied, and the chemistry, history, and medical uses of cork, are given in the author's paper; and while on the subject of corks the author does not forget that useful instrument, the corkscrew, which, unknown about two hundred years ago, is now in some shape or other to be found in all parts of the civilized world.—Ph. J. Trans., June 7th, 1879, p. 995.

Suberin (Cork-powder).—Brochard recommends suberin for the treatment of chapped nipples. When chaps exist on the nipples, whatever their extent, the nipples should be washed with pure water, and then dried and dusted with suberin, which, as is known, is impalpable cork-powder. Mr. Brochard has used it for several years, and prefers it to lycopodium for infants, because it contains tannin, and besides is much cheaper. Over the suberin is placed a piece of goldbeaters' skin cut star-shaped, in the centre of which several punctures are made with a fine needle. Every time the child is suckled the suberin is washed off with water and the goldbeaters' skin replaced, the child drawing the milk through it without giving pain. When the child is done the suberin is again applied as before, and so on.—A. J. Ph., June, 1879, p. 323.

Chestnuts—Uses.—"Die Natur" observes that the common horse-chestnut is capable of furnishing several useful products which are regularly manufactured in several localities in Europe.

The seeds contain over 36 per cent. of starch, which is easily obtained in the same manner as that made from cereals. 240–250 lbs. of the seed yield 100 lbs. of dry starch. Paste made from the latter is exceedingly adhesive, *and is not attacked by insects*; it is therefore particularly well adapted for the purpose of bookbinding. This starch is also used for producing certain kinds of distilled liquors. For this purpose 50 lbs. of starch are heated for 6 hours with 2 lbs. of sulphuric acid and 150 lbs. of water, whereby the starch is converted into sugar; the acid is then neutralized by lime, the liquid decanted, mixed with yeast and fermented, and finally distilled. 100 lbs. of starch yield 24 lbs. of spirit of 55 per cent.—New Rem., February, 1879, p. 49.

CONIFERÆ.

Pinus Monophylla.—The seeds of this pine, common on the border of Lower California, are gathered by the Indians for food. Though rich and good when fresh, they are more digestible when roasted, in which condition they will also keep and are stored. Ground into flour, they are made into a palatable and nutritious bread or mush. The interior of the young cone is also eaten. The harvest commences as soon as the cones begin to open; the children gather the cones from the ground, the females pluck them from the trees, lowering their collection from time to time in a net. To facilitate the opening of the cones they are thrown on hot ashes a few minutes; the seeds are then removed, put into an earthen pot over a slow fire, and after a few stirrings are sufficiently parched to render the hull brittle, so as to be easily removed. The nuts of

P. Torreyana, a very rare pine, growing only on the hills of Solidad, Southern California, are also used as food by the Indians near by. The fruit is large and wholesome.—Dr. E. Palmer, A. J. Ph., November, 1878.

Strassburg Turpentine.—G. H., a resident of the Vosges Mountains, in which this variety of turpentine is collected (from *Pinus picea*, L.), gives some interesting information in reference to its collection and characters. The trees compose about 25 per cent. of the woodland in the Vosges, and flourish best on the northern declivities at a height of 600 to 800 meters. They yield most abundantly from their 25th to 50th year, at which period their height is from 8 to 15 meters. After they are 50 years old the yield decreases, and ceases almost

altogether with their 60th year. The oleo-resin is contained in small vesicles in the bark, varying in size from a pin's head to a bean. These are punctured, and a small tin vessel is fastened beneath to collect the exudation. Cutting is never resorted to. The turpentine, clarified by standing, has the consistence of syrup, an amber-yellow color, balsamic, almost lemonlike odor, and an acrid, bitterish taste. It has a strong acid reaction, dries very readily, is soluble in an equal weight of alcohol, and becomes hard and dry within 24 hours upon the addition of $\frac{1}{8}$ th of its weight of magnesia. This relation to magnesia is noteworthy, since Dorvault and Guibourt have made the statement that Strassburg turpentine is not solidifiable by magnesia.—*Zeitschr. Oest. Ap. Ver.*, January 1st, 1879, p. 10.

Juniperus Pachyphlæa, Torr.—The fruit of this, one of the finest ornamental junipers, abounding in Arizona, is a staple article of food among the Indians. It is sweet, has but little juniper taste, and is eaten raw as soon as ripe, being stored for winter use in great quantities; it is then ground and made into bread. The wood is excellent for cabinet-work. The fruit of

J. Californica is also consumed in immense quantities by the Southern California Indians, either when just ripe, or when dry, in the form of bread, or boiled with water to the consistence of mush. The fruit is sweet and very nutritious. The tree is a showy dwarf evergreen. The fruit of a variety of this plant,

J. Californica var. *Utahensis*, is also sweet, and used like the above by the Utes. The fibrous bark is made into saddles, breech clouts, skirts, and mats to sleep on, but it is rather brittle, and not so good for domestic purposes as that of *Cowania Mexicana*. Finally, the berries of

J. occidentalis are also gathered and consumed as food, but have more of a juniper taste than the former species.—Dr. E. Palmer, *A. J. Ph.*, November, 1878.

CYCADEÆ.

Tamia Integrifolia (Coontie-root).—From the tubers of this plant the Florida arrowroot is made. It is abundant in the southern part of the State. The tubers are large, frequently a foot long and three inches in diameter, rough and dark on the outside, but white inside, and yield a large percentage of starch. It possesses an acid, poisonous ingredient, which has to be

washed out in the process of converting the root into starch. The Indians of the Everglades consume a great deal of starch as food, prepared by their rude processes, and also sell some, but it is inferior to that prepared by the whites with improved machinery.—Dr. E. Palmer, A. J. Ph., November, 1878.

UNCLASSIFIED VEGETABLE DRUGS.

Batiator Root—A Substitute for Ipecacuanha.—Stan. Martin draws attention to this drug, which has properties very similar to those of Ipecacuanha, and is given in similar doses. The plant is found on the Senegal, and is now being propagated in Paris from the seed. Batiator root is described by Mr. Martin as being 2 or 3 decimeters long, thin, cylindrical, slightly flexuose, longitudinally striate or wrinkled, often with circular divisions, forming more or less elongated annulations, the fissures penetrating to the central threadlike wood-fibre. It is yellowish or grayish-brown, internally yellowish, breaks with a smooth fracture, is inodorous, has a slight acrid taste, and on mastication leaves in the mouth a nauseous impression, similar to that from ipecacuanha. The roots are in fascicles from a knotty, uneven root-stock, which is covered with short and appressed gray-brown silky hairs.—A. J. Ph., October, 1878, p. 478; from Bull. Gén. de Thér., July, 1878.

Coto Bark—New Constituent.—J. Jobst and O. Hesse have obtained a new constituent from coto bark, which they have recognized as

Piperonylic acid ($C_8H_6O_4$) by the properties of several of its salts, and by its reaction with sodium amalgam, permanganate of potassium, baryta-water, bromine, and dilute hydrochloric and sulphuric acids. It is obtained from coto bark, which has been previously extracted with ether, by digestion with milk of lime, acidification of the alkaline solution, and agitation with ether. The residue obtained on evaporating the ethereal solution is dissolved in hot alcohol, which on cooling deposits the acid as a white crystalline powder.—Ber. d. d. Ch. Ges., XI, 1031–1034; in J. Chem. Soc., September, 1878, p. 733.

Gouania Domingensis—A New Vegetable Dentifrice.—Amongst the products in the Jamaica collection sent to the Paris Exhibition by Mr. C. Grant, of Kingston, are various products of a rhamnaceous plant popularly known in the West Indies as

Chewstick.—This, though not indigenous to Jamaica, is perhaps better known there than in other islands, where varieties of it are known. The plant is a very beautiful and thick bushy vine, with a profusion of foliage climbing upon the trees growing in its neighborhood, and with a stem varying in thickness from that of a walking-stick to that of a pen-holder. The stem is very fibrous, and when these fibres are detached at the end of a section of the stem by *chewing*, becomes a rude but most perfect tooth-brush, giving out in the mouth, when rubbed over the teeth, a thick, saponaceous froth, of a pleasant, aromatic, bitter taste, which remains in the mouth for some time, and which serves not only the purposes of a tonic bitter when used in this way, but also whitens the teeth and hardens the gums; on this account it is extremely popular in Jamaica as a dentifrice among all classes, and has attracted a great deal of favor in foreign countries. Mr. Grant exhibited the article in bundles, in the form of tincture,—prepared with dilute spirits of wine, and which is sold as a dental tincture,—and in the form of powder, which is used as tooth powder in the ordinary way. Another peculiar property which this article possesses is that it imparts to water a warm, bitter, aromatic taste, and if the fluid is poured from one glass into another it will be found to have acquired all the appearance and flavor of beer (minus its alcoholic flavor) in a high state of fermentation. On this account ginger-beer sellers in Jamaica use it very freely to give their wares a semblance of fermentation.—*Drug. Circ.*, August, 1878, p. 135.

Myriogyne Minuta and M. Cunninghami.—*Presence and Isolation of a New Acid*.—Ferd. von Müller has subjected these Australian plants to chemical examination, and has obtained, besides volatile oil, a new acid,

Myriogynic Acid.—It is obtained by treating the herb (either species) with alcohol, evaporating the tincture, dissolving the extract in water containing ammonia, acidulating the filtrate with hydrochloric acid, agitating with ether, and evaporating the ethereal solution; upon washing the residue with water, myriogynic acid remains. This composes a friable yellowish or brownish mass, having an acid reaction and bitter taste; it is very sparingly dissolved by cold water, more readily in boiling water, very readily in alcohol, less in ether, and readily in alkaline solutions. Sulphuric acid forms a red-brown solution, which is precipitated on addition of water. Conc. nitric acid dissolves

it with a yellow color; hydrochloric acid has no effect upon myriogynic acid. The volatile oil will be the subject of further examination, which the authors have been led to undertake on account of the stimulant properties—similar to arnica—of the plants. The generic name, Myriogyne, which the authors still retain, has in recent years again given place to the older one, "*Centipeda*," originally given by Loureiro. Both plants are widely distributed throughout Australia, and *M. minuta* also in Southern Asia.—Zeitschr. Est. Ap. Ver., November 1st, 1878, p. 489.

Loxopterigium Lorentii, Grisebach — *Description of Gummy Concretion—Quebracho Gum.*—Mr. Pedro N. Arata gives a description of the gum of the "Quebracho Colorado" (*Loxopterigium Lorentii*, Grise.), a tree indigenous in, and peculiar to, the northern part of the Argentine Republic. This so-called gum, or rather thickened juice, collects in the cracks and hollows of the wood in ruby-red concretions, somewhat resembling colophony, but more brittle; it is easily pulverized, and yields a brick-red powder, odorless, but slightly astringent to the taste; specific gravity 1.3756 at 15° C. (= 59° F.). It is easily soluble in alcohol, acetone, and acetic ether; dissolves also in amyl, alcohol, and acetic acid, but is insoluble in benzin, bisulphide of carbon, chloroform, and oil of turpentine; nearly insoluble in cold water and ether; nevertheless an ethereal solution, having an emerald-green color, may be obtained by crystallizing the gum with ether and water. Boiling water dissolves it completely, and deposits part on cooling. It dissolves also in strong sulphuric acid, and is precipitated therefrom by water. Subjected to combustion, finally, in a current of oxygen, the residue is scarcely appreciable. Subjected to dry distillations it yields, among other volatile products, pyrocatechin; by the action of boiling diluted nitric acid it yields oxalic and picric acids; and when fused with potash it yields protocatechuic acid. The production of these bodies point to the presence of one of the bodies called catechins; but in consequence of the great tendency of these bodies to alteration the author has not yet been able to obtain satisfactory evidence of their actual presence in this gum.—Ph. J. Trans, December 28th, 1878, p. 531; from Anales de la Soc. Cientifica Argentina, July, 1878, in J. Chem. Soc.

Simmondsia Californica.—The nuts of this plant yield a very

fine oil. Indians of Southern California use them as an article of food.—Dr. E. Palmer, A. J. Ph., November, 1878.

Milla Capitata var. *Pauciflora*, commonly called *Corvena* by the Mexicans of Sonora and Arizona.—It is rather a small bulb, resembling the crocus both externally and internally. Its taste is sweet, agreeable, and mucilaginous, and is considered very nutritious even by Americans.—Dr. E. Palmer, A. J. Ph., November, 1878.

Cowania Mexicana.—This tree, before the advent of Europeans, was the great source from which the Nevada and Utah Indians obtained the materials for their dress-goods. The outer bark is rough, but the inner is soft, silky, and pliable, and of a brownish color. It is removed in long strips, varying in width, a desirable quality in a bark that is used in the manufacture of clothing, sandals, and ropes. These articles were formerly made by braiding strips of bark together, or woven with the hand-loom. Females made skirts from strips of this bark by braiding a belt to which they suspended many strips of the same material, hanging down to the knees like a long fringe. The rest of the person was naked in summer.—Dr. E. Palmer, A. J. Ph., December, 1878.

Chlorogalum Pomeridianum.—The large bulbous root, the common soap-root of California, and called by the Indians and Mexicans, *Smole*, yields a great quantity of saponin, and is very good for washing, being much used for this purpose by poor people and the Indians of California. The rough covering of the root is formed into bunches, tied up, and used for hair-brushes by the Indians.—Dr. E. Palmer, A. J. Ph., December, 1878.

Anemopsis Californica (*Yerba Mansa* of the Mexicans).—The root of this plant is a great remedy among the Indians of Arizona and Sonora, in Mexico, and Southern California. It has a strong peppery taste and odor. A tea made from the roots, and a powder prepared from the same and applied to venereal sores, are a great remedy. In the latter form it is advantageously used on cuts and sores, as it is very astringent. The leaves, after being wilted by heat and applied to swellings are a sure cure.—Dr. E. Palmer, A. J. Ph., December, 1878.

Oreodaphne Californica.—This fine evergreen tree of California has a very strong spicy odor. By rubbing the hands and face a short time with the leaves, a very disagreeable headache will be produced. Dr. P. observes that Hahnemann is not the

only discoverer of the fact that like cures like, for long before he was born, the Indians of California were aware of the power which this plant had to produce a headache in those that were well, and to cure those that were afflicted with it.—Dr. E. Palmer, A. J. Ph., December, 1878.

Lygodesmia Spinosa.—This plant produces a short, fine, silky substance just at the juncture of the roots with the branches, which is used by the Digger Indians to stop the bleeding in gunshot wounds. A similar substance is used by the Apache Indians for a like purpose. It is obtained from

Perezia Arizonica, and, like the above substance, it is situated at the junction of the branches with the roots. It is well adapted for the use to which it is applied.—Dr. E. Palmer, A. J. Ph., December, 1878.

Ephedra Antisyphilitica.—This plant is called *teamster's tea*, since men travelling with teams in New Mexico, Arizona, and Southern California, camping among Indians, contract venereal diseases, and use this plant abundantly as a remedy, taken internally in the form of tea. A quantity of the plant is often taken along in case of need. This is a well-known remedy for gonorrhœa among many Indians and Mexicans. It is a strong astringent, and may prove valuable for its tonic properties.—Dr. E. Palmer, A. J. Ph., December, 1878.

Evernia Vulpina.—This lichen yields the highly-prized yellow paint found so frequently among the Western Indians. The Apaches of Arizona carry a portion of it carefully in a small buckskin bag. It is considered a charm when applied to the face, and a cross of this color on their feet enables them to pass their enemies unseen.—Dr. E. Palmer, A. J. Ph., December, 1878.

Sueda Diffusa (*Sah-ap-weep of the Pah-Utes*).—The very small seeds of this plant, which are very difficult to clean, are gathered in large quantities by the Pah-Ute Indians, who use them as food. They are ground fine and made into biscuits, but the flour tastes best when made into mush, as the seeds have a decided salty, potash taste. The Coahuila Indians of Southern California make a fine black dye by steeping a quantity of the plant in water. The color is very durable, but has a very fetid, disagreeable smell. Another species,

S. Californica, also yields a dark coloring matter. This plant, at San Diego, California, is commonly called glasswort, from the

glassy brittleness of the stems. It yields much caustic potash, and the ashes are used by soapmakers. The seeds are gathered by Indians for food.—Dr. E. Palmer, A. J. Ph., December, 1878.

B. ANIMAL DRUGS.

Meloë Tuccius and Mylabris Tenbrosa (?)—*An Arab Remedy for Hydrophobia*.—Mr. L. Reiche has forwarded to the Entomological Society of France two species of Coleoptera, which arrived in fragments, and appear to be the above strongly vesicating insects, which he states constitutes an Arab remedy for hydrophobia. They were given him, south of the Ouderna, by a man of the tribe of the Amernas, who gave a detailed account of their virtues and fully explained the manner of using them. On his return to Gabes Mr. Reiche spoke of this remedy to a very intelligent Arab, who affirmed that all he had heard was true, that he might read in their medical works that the *Dernona* cures madness if administered within twenty days from the bite; that the patient should take a piece of the size of a grain of wheat in a morsel of meat. The insect is said to have very strong vesicating powers, and to increase the dose much would be dangerous to life. Its use occasions severe colic. It is to be remarked that the use of *Meloë* was recommended as far back as 1856 in a communication made to the society by Mr. L. Fermaire.—*Les Mondes*, July 18th, 1878; in *Ch. News*, August 30th, 1878, p. 114.

Blatta Orientalis—The diuretic properties of the common cockroach, which have been long known in Russia, seem to destine this insect to recognition in the *Materia Medica*. Dr. Hager, in his "Pharm. Praxis," devotes some space to their consideration. The insects, after drying, may be kept in the form of a coarse or fine powder, the dose of which is 0.1–0.2 to 0.5 grams three to five times daily. It may be given in corresponding doses in the form of infusion or tincture. The latter is made by digesting one part of the coarsely powdered insects with five parts of diluted alcohol.

According to Bogomolow the cockroach contains a crystalline compound, which has been named antihydropin or taracandin. Used for a long time in Russian domestic practice it has in recent years also been used by physicians in the treatment of dropsy.—*Ph. Centralh.*, July 25th, 1879, p. 279.

Professor X. Landerer states that the variety *Blatta orientalis* is found in Greece, and is a great nuisance. For some time past the powdered insect and its preparations have been recommended as remedies in dropsy, and Professor Landerer made this use of the insect known. He reports, however, that it was found inefficient in dropsy, although it had hydragogue properties. A species of cockroach, *Blatta Laponica*, is called tarakané (or trakané) in Russia. These insects are also called "Preussen" (Prussians) in Russia, and "Russen" (Russians) in Tyrol and Southern Germany, being probably carried there by the invading armies during the Seven Years' War.—N. Rem., March, 1879, p. 67.

Blistering Beetles—Valuation.—Mr. Levi Fabnestock has estimated the value of some blistering beetles, employing for the purpose Procter's method, as modified by Fumouze, and Dragendorff's method. He found the latter to give more satisfactory results. The former consists in extracting the beetles with chloroform, evaporating the chloroformic solution, removing fatty matter from residue by bisulphide of carbon, and crystallizing the residue of cantharidin from alcohol. Dragendorff's process consists of first treating the powdered beetles with hydrate of potassium, then adding hydrochloric acid in excess, drying, treating the dry mass by displacement with petroleum benzin to remove the fat beforehand, and then treating with chloroform, etc., as above. The results of Mr. Fabnestock's experiments are summed up as follows:

1. Old *Mylabris cichorii* yields 1.25 per cent., and fresh *cantharis vittata* 1.3 per cent. of cantharidin.

2. By age the virtues of the beetles are impaired and less effectual for vesication, and a portion of what appears to be fatty matter becomes insoluble in bisulphide of carbon, petroleum benzin, etc., rendering the isolation of cantharidin much more difficult.

3. By the treatment with hydrate of potassium and hydrochloric acid the yield of cantharidin is increased, probably from the decomposition of ammonium and magnesium compounds of cantharidin contained in the beetles.

4. By exhaustion with petroleum benzin a large quantity of the fatty matter, but no cantharidin, is removed, thus facilitating the subsequent operations.—A. J. Ph., June, 1879, p. 297.

Abnormal Castor-sac.—Dr. R. Godefroy communicates the results of the examination of an abnormal castor-sac made by Mr. Josef Rudolf. The sac weighed 82 grams, had a diameter of 17.5 cm., and was 6.6 cm. high. It was composed of two layers of thin membrane of brown-black color, which were readily removable, and inclosed a hard firm gray mass, which scarcely had the odor and taste of castor. The examination of Mr. Rudolf showed that this gray mass was composed of 0.3305 per cent. silica, 47.0690 per cent. carbonate of calcium, and 52.5980 per cent. of substances volatilizing at a red heat. Treated with *alcohol* it yielded 7.723 per cent. of dry extract; according to the present experience the great bulk—the so called castoreum resin—should be taken up by that menstruum. *Petroleum ether* extracted 3.402 per cent. of the substance. Hager found Siberian castor to yield 4.6 per cent, Canadian, 1.96 per cent., and believed such extract to afford a criterion of the quality of castor, a belief that certainly is not substantiated in this instance. The residue after treatment with petroleum ether yielded 0.386 per cent. of substance to *chloroform*; it should, according to Hager, be sticky, brown, or brown-yellow, and have the specific odor of castor. The present substance was sticky, but had only a faint odor of castor. Water extracted from the original mass 3.553 per cent. of substance, and the residue after extraction with water yielded 12.38 per cent., a quantity considerably higher than that obtained by Lehmann from German (7.4 per cent.), from Russian (2.5 per cent.), and Canadian (8.2 per cent.) castor by the same treatment. Finally, a portion of the gray mass was dried and found to lose 4.425 per cent. of moisture, and another portion yielded to ammonia solution 2.394 per cent. of soluble substance.

As a result of these experiments Dr. Godefroy concludes that, although the castoreum sac under examination possessed all of the characters of the genuine sac, the large percentage of carbonate of calcium present renders it unfit for medicinal purposes. A high percentage of this compound has already been observed by others in castors from Siberia, Europe, as well as Canada; in a European sac, indeed, as high as 85 per cent. The percentage in good castor should not exceed 3 per cent.; a high percentage must be regarded as abnormal, and is, according to Hager, probably caused by a disease of the animal.—*Zeitschr. Æst. Apoth. Ver.*, January 20th, 1879, p. 33.

Castor—Historical Notes.—Referring to the above observations of Dr. Godefroy and Mr. Rudolf, Dr. H. Hager expresses the hope that this medicament, which possesses no advantages over valerian, may be expunged from the *Materia Medica* by the Ph. Germ., as has already been done by the Ph. Austriaca. In the way of a farewell to castor as a medicament Dr. Hager gives the following historical notes:

The beaver appears to have been distributed over all Europe during early periods, for Hippocrates, and subsequently Galen, Celsus, and Aretæus, employed castor in the treatment of womb complaints and convulsions. The meat of the beaver resembles beef, but is richer in fat and has an unpleasant meat odor. The fat tail, roasted, was regarded as a dainty dish by the ancients. The fat surrounding the castor-sac (*Axungia castorei*) was used as a softening embrocation, also for pains of the nerves and paralysis; and the fat of the tail is used in Canada, as is the marrow-fat in Europe, as a nerve-strengthening ointment. Rondelet (1540) recommends the gall of the beaver as a remedy for cataract and as an aphrodisiac; others lauded the blood against epilepsy and inflammatory conditions of the organs of the breast; the urine as an antidote (*Alexterium*); the hair for arresting the bleeding from wounds; the teeth as amulets for the teething of children, and, when calcined, internally against croup and sideache. According to Plinius the skin was used for wrapping and covering the parts affected by gout, and others subsequently recommended it as a covering for atrophic children, for women suffering with puerperal fever, and for those affected with hydrophobia. A certain "Meyer" even believed to have discovered that by wearing the skin of the beaver the memory is strengthened. Castor seems to have been used as a popular remedy even before the time of Hippocrates. It was used against nervous maladies of every kind, against epilepsy, and even against mental affections; it was regarded as an opium of animal origin.—Ph. Centralh., February 16th, 1879, p. 65.

INORGANIC CHEMISTRY.

OXYGEN.

Ozon—Instability.—According to recent observations of Berthelot ozon soon changes when kept. A number of flasks containing each about 260 cc. ozonized oxygen were kept for some time at 12° C. (= 53.6° F.). The titre of the gas at first was 2.2 per cent. ozon; after 24 hours, 2.1 per cent.; after 5 days, 1.2 per cent.; after 14 days, 0.4 per cent.; after 51 days, only traces could be detected; and after 60 days it could no longer be detected either by its odor or by iodide of potassium. The ozon was dry; moisture, however, does not appear to hasten the change, at least not in the first two weeks. Ozon has often been compared to a gas whose atoms are charged with negative electricity. Mr. Berthelot's experiments upon the equivalent influence of both positive and negative electricity during the formation of ozon are, however, not favorable to this hypothesis.—Ph. Centralh., May 1st, 1879, p. 180.

Ozon—Solubility in Aqueous Solutions of Oxalic Acid.—Professor Beilstein at a recent meeting of the Russian Chemical Society called attention to the discovery of Mr. Joremin that ozon is absorbed in considerable quantities by aqueous solutions of oxalic acid, and that in that form it may be preserved for any length of time. According to his observations, indeed, a freshly-prepared solution is not as active as a disinfectant as one that has been prepared for some time. In its gaseous condition ozon is preserved better in the light than in the dark.

The author has also prepared a lute with pumice, paraffin, wax, and resin which is not affected by ozon, and which may be used for the construction of stoppers, spigots, tubes, and other utensils. For substances which attack paraffin he recommends a composition prepared with glycerin and gelatin.—Ph. Centralh., July 4th, 1878, p. 252.

HYDROGEN.

Hydrogen—Spontaneous Combustion.—During the solution of zinc in hydrochloric acid, in the preparation of chloride of zinc, Mr. P. W. Hofmann has frequently observed explosions without being able to explain the cause by ordinary agents. These ex-

plosions were subsequently found to be spontaneous. During the rapid evolution of the hydrogen very finely-divided zinc particles are carried with the gas when the zinc has become porous, and these, when in contact with air and hydrogen, occasion, like spongy platinum, the combustion of the mixture. Experiments made with zinc dust and hydrochloric acid have proven the correctness of this view. In the establishment of E. Schering similar observations have been made, without, however, succeeding in definitely determining the cause. In this establishment the process is conducted in an open vessel under a good flue, and in the event of the ignition of the hydrogen it is extinguished by placing an iron lid over the vessel.—Ph. Centralh., July 18th, 1878, p. 266.

Ice—Cheapened Production by the Aid of Trimethylamin.—Ch. Tellicr, who has a wide reputation in connection with the production of artificial ice, has recently further improved his methods by the application of trimethylamin (psoudopropylamin). The latter is now produced in large quantities by the method of Cam. Vincent from the residues of beet-sugar manufacture. With appropriate and large apparatus, the construction of which, however, is quite simple, he expects to produce 10,000 kilograms of ice per hour.—Ph. Centralh., July 18th, 1878, p. 271.

Peroxide of Hydrogen.—Mr. George H. Davis observes that while most books tell us that peroxide of hydrogen is made by a roundabout process with BaO_2 and HCl , it is now made principally by means of peroxide of barium and hydrofluoric or fluosilicic acids: an insoluble fluoride or fluosilicate of barium being formed, which separates at once, and peroxide of hydrogen remains. If these materials are pure of course no hydrochloric acid can be expected in the purchased articles of commerce. Peroxide of hydrogen, however, as found in the markets, is often indifferent as regards purity, as well as effective oxygen, and should, therefore, be always subjected to examination. For general work the method known as the bichromate method is preferred by the author to the other methods suggested for the determination of effective oxygen. The author examines each purchase as follows: 100 cc. of the peroxide of hydrogen is evaporated to dryness with 10 cc. of normal soda, ignited, and taken up again by water. Normal acid is then added to neutrality, then chromate of potassium, and finally it is titrated with $\frac{1}{10}$ nor-

mal nitrate of silver. The results, in an instance mentioned by the author, showed that 100 cc. of the peroxide neutralized 0.2 cc. of normal soda, and consumed 3.4 cc. $\frac{1}{10}$ normal nitrate of silver. On evaporation to dryness of the peroxide by itself a very pungent acid is liberated, which can easily be told is not hydrochloric acid.

Peroxide of hydrogen, in the author's experience, shows much greater stability than is usually attributed to it. If it is decomposed by the simple passage of air through it, as has quite recently been stated, certainly a great deal is required. To show the moderate stability of the peroxide the author mentions that he has recently examined a sample that was at least fifteen months old, and upon which no especial care appears to have been bestowed. When treated with bichromate over mercury it gave seven volumes of oxygen. With a ready method for testing its amount of active material peroxide of hydrogen may be made to serve as an exceedingly useful oxidizing agent, for it oxidizes by reason of its loosely combined oxygen, and when an excess is added to any substance, or to a solution, that excess is readily eliminated, leaving only as a residue that most neutral of substances—water.—Chem. News, May 23d, 1879, p. 221.

Peroxide of Hydrogen—Reaction with Iodide of Potassium.—Em. Schöne has communicated (Liebig's Annalen der Chem., vol. 195, Nos. 1 and 2) experiments made with a view to determine the relation of peroxide of hydrogen to iodide of potassium, and has arrived at the following conclusions, based upon the literature on the subject and his own experiments, which are of importance in connection with the examination and determination of ozon in the air:

1. Pure peroxide of hydrogen separates iodine from iodide of potassium, and it is indifferent whether it is applied in the form of vapor or in aqueous solution.

2. This action results in the formation of caustic potassa, which neutralizes the acid reaction dependent on free acid in the peroxide of hydrogen.

3. The more dilute the solutions, the slower will be the reaction and its completion. In the presence of one-millionth part of the peroxide, 20 minutes will elapse before the reaction begins.

4. The direct reaction of the two agents is distinguished by

gradual progression from that produced by the intervention of ferrous sulphates.

5. The reaction occurs with evolution of oxygen, which, in the presence of 1.2 gram of peroxide of hydrogen to 100 cc. of liquid, occasions brisk effervescence.

6. The liquid becomes yellow from the separation of iodine, and blue in the presence of starch. The intensity of these colorations is to a certain limit independent of the quantity of peroxide. When the quantity of peroxide sinks below 10 milligrams per liter, no coloration is evidenced without the addition of starch, and with the latter addition it may sink to 1.2 milligram before color evidence fails to be manifested.

7. The author explains the process to be catalytic, and finds that bromide of potassium, chloride of potassium, chloride of sodium, chloride of calcium, and other haloidal salts of the alkalies and alkaline earths react analogously, and that the reaction is the more energetic in the degree that the atomic weight of the various halogens is greater. Potassium salts, also, appear to react more energetically than the corresponding sodium salts.—Ph. Centralh., April 10th, 1879, p. 157.

Sulphuretted Hydrogen—New Apparatus.—Mr. Le R. C. Cooley has constructed the apparatus illustrated by Fig. 47, and believes that no other form is at once so efficient, so nearly odorless, so cheap, and so convenient to use. It consists of the plain, but strong wooden frame, constructed with the base-board, *B*, the standard, *T*, supporting the cross-piece, *C*, on top of which, near its ends, are two iron pulleys. Over these passes a strong cord, to the ends of which two platforms, each provided with four stiff-curved iron wires meeting at the points *d* and *E*, are fastened, and, like a pair of scale-pans, have free vertical motion. The materials for generating the gas are placed into two bottles, *A* and *S*, one on each platform. These bottles being tubulated near the bottom, are connected by means of thick rubber tubing, which is rendered more impervious to gas by immersion in melted paraffin. The bottle, *A*, is to be filled to one-half its capacity with dilute acid, while in the other bottle, *S*, fragments of ferrous sulphide rest upon a thick layer of broken glass or silicious pebbles. The gas-bottle, *S*, is provided with a tightly-fitting rubber or paraffined cork-stopper, through which passes the delivery-tube, which may be opened or closed at pleasure by means of the usual pinch-cock arrangement shown in the cut. At the lower end of

the delivery-tube is a long, perforated, tapering rubber stopper, perforated with two holes. One of these holes is lined with a piece of rubber tubing, the ends of which project a little beyond

FIG. 47.



Sulphuretted Hydrogen Apparatus.

the stopper. This arrangement permits the insertion of a separate piece of glass tubing beneath the stopper, by which a solution may be fed with gas, and its removal for cleansing after each operation. From the other perforation a bent tube passes into a bottle, *C*, containing ammonia-water. The cut represents the apparatus in operation. To stop the generation of gas, the pinch-cock on the delivery-tube is closed, and the platform carrying the gas-bottle simply lifted, when the apparatus will be ready for the next operation after the removal of the test-tube and absorbing-bottle and cleansing of the lower glass delivery-tube. If the joints are well made, the laboratory will be free from the odor of the gas, except that due to the small quantity remaining in the

tube and flask removed.—New Rem., April, 1879, p. 101; from Sc. Amer.

Sulphhydric Acid—Importance of Purity in Forensic Determination.—In the older works on forensic chemistry the importance of testing sulphuretted hydrogen for its purity seems to have been disregarded, and it was not until 1869 that attention was drawn by J. Otto to the fact that arsenuretted and sulphuretted hydrogen may exist together, and that it is therefore of the utmost importance to secure the freedom of the latter from this impurity in forensic determination. Since then attention has been drawn to the same subject by various authors, notably Myers and Dragendorff. Professor R. Otto now again draws attention to the impurity mentioned, and the difficulty with which, with ordinary reagents, a sulphuretted hydrogen, free from arsenic, may be obtained. Dragendorff recommends (in a letter to Professor Otto) that the sulphide of iron to be used for generating HS be prepared from washed sulphur (with soda solution?) and pure wrought iron, and that this be decomposed by the first portions that pass during the rectification of sulphuric acid, which contain, it is true, some oxide of nitrogen, but are free from arsenic. Professor Otto recommends instead that the HS be generated from sulphide of calcium with pure hydrochloric acid. Sulphide of calcium suitable for this purpose is readily obtained by the reduction of gypsum with charcoal at a red heat. If the acid is allowed to flow by drops upon the sulphide of calcium in coarse lumps, a steady and regular current of pure sulphuretted hydrogen is readily produced. The complete absence of free hydrogen from the sulphuretted hydrogen produced has the further advantage, that even in the presence of arsenic no arsenuretted hydrogen can be produced.—Schweiz. Wochenschr. f. Ph., March 21st, 1879, p. 101.

NITROGEN.

Hyponitrous Acid (?) (Untersalpetrige Säure, NO + HO).—In 1871 E. Divers had obtained a silver compound which he believed to have the composition $\text{AgO} + \text{NO}$. J. D. Van Der Plaats has now obtained this compound, as did Mr. Divers, by the action of excess of sodium amalgam on solution of nitrite of potassium. The latter is dissolved in 3 parts of water and the amalgam is gradually added, when violent reaction occurs, and a gas, com-

posed of 40 per cent. nitrogen and 60 per cent. nitrous oxide, is evolved; this liquid is neutralized with acetic acid and nitrate of silver is added, whereupon a precipitate of acetate and hyponitrite of silver is produced, of which the acetate is soon decomposed in the light. Upon treating the precipitate with diluted sulphuric acid, oxide of silver remains, and hyponitrite enters into solution, from which it is precipitated, of handsome yellow color, by ammonia. The yield is about $\frac{1}{7}$ of the weight of nitrite of potassium used.

Free hyponitrous acid is obtained by decomposing the silver salt, in excess, with hydrochloric acid. It forms a colorless, strongly acid liquid, which is tolerably permanent, and may even be boiled with acetic acid and nitric acid without decomposition. It colors iodide of potassium starch blue, and reduces permanganate of potassium. Its composition in the free state is $\text{NO} + \text{HO}$, and it is decomposed into water and nitrous oxide by concentrated sulphuric acid.

Hyponitrite of silver, produced as above, is amorphous, pale yellow, permanent in air and diffused light, insoluble in water, not changed at 100°C. ($=212^{\circ} \text{F.}$), but decomposed at 110°C. ($=230^{\circ} \text{F.}$). It is readily dissolved by dilute sulphuric acid, and reprecipitated on neutralization; not decomposed by carbonic acid; nor by soda solutions before a temperature of 70°C. ($=158^{\circ} \text{F.}$) is reached. Phosphoric acid, sulphhydric acid, and boiling acetic acid liberate hyponitrous acid. 100 parts contain 78.26 Ag, 10.14 N, and 12.60 O, corresponding to the formula $\text{AgO} + \text{NO}$.—Zeitschr. Chem. Ap. Ver., July 10th, 1878, p. 318.

Nitrous Acid—New Reaction.—According to Griess the liquid to be tested is acidulated with sulphuric acid, and some anilin sulphuric acid is added; 10 minutes afterwards a few drops of decolorized solution of sulphate of naphthylamin is added, when in the presence of the slightest trace of nitrous acid a deep-red color is developed. Under these conditions the nitrous acid converts the sulphanilic acid into diazobenzol-sulphuric acid, which unites with the naphthylamin to form a new coloring matter discovered by Griess.—Ph. Centralh., May 1st, 1879, p. 179.

Nitrous Acid.—C. Preusse and F. Tiemann have examined the above-mentioned method of P. Griess, and find that it is practicable in case of dilute solutions. Stronger solutions must be diluted with water free from nitrous acid, just as is required in the application of Nessler's test to ammoniacal solutions. The authors con-

clude, however, that in all waters which cannot be perfectly decolorized, the method with zinc iodide and starch is preferable, after the absence of iron compounds has been ascertained.—Ber. d. d. ch. Ges., No. 6, 1878; in Chem. News, July 5th, 1878, p. 9.

Nitrite of Potassium—Preparation.—H. Müller and C. Pauly review the various methods that have been proposed for the preparation of nitrite of potassium, most of which are based upon a reduction of the nitrate; they give preference to the method proposed by Persoz (see Proceedings, 1878, p. 342), by which the reduction of the nitrate is accomplished with extremely finely divided metallic copper, obtained by heating crystallized acetate of copper. When an intimate mixture of such copper and nitrate of potassium is heated in an open vessel, reaction, with incandescence, takes place at 220° – 250° C. ($= 428^{\circ}$ – 482° F.), and very pure nitrite and chemically pure cupric oxide are produced. Notwithstanding the advantages of this method, those of Stromeyer, modified by Feldhaus (melting nitrate of potassa with an equal weight of lead to complete oxidation of the latter), and of Warrington (heating a mixture of nitrate of potassium and starch to redness, until the mass again becomes white), have retained their popularity. The authors are of the opinion that the reason why Persoz's method is not more generally employed is to be found in the circumstance that the production of finely divided copper from cupric acetate by distillation is expensive, and requires much time. They have, therefore, sought a cheaper source of providing copper that should have the conditions required for the process, and find this in the product obtained by the action of commercial zinc-dust upon sulphate of copper. The zinc-dust of commerce being, however, a mixture of 70 per cent. or less of metallic zinc with oxide of zinc and small quantities of foreign metals, such as iron and cadmium and their oxides, a method embodying definite proportions cannot well be given. But neither zinc-dust nor cupric sulphate are expensive, and they, therefore, propose the following process, in which the two substances are employed in excess:

Zinc-dust, sifted if necessary from coarser particles, is triturated to a thin paste with water, and added in portions corresponding to 10 or 15 grams to a cold, moderately concentrated solution of good cupric sulphate contained in a flask. After each addition

the mixture is agitated well, and in case it should become very warm is cooled as rapidly as possible by placing the flask in cold water, whereby the decomposition of the sulphate of copper by the zinc oxide present is in a great measure avoided. The addition of zinc-dust is continued in this manner and proportions until the color of the clear supernatant liquor indicates the presence of but a small proportion of undecomposed cupric sulphate, when the quantity added each time is reduced—finally to 1 gram at a time—until a slight excess has been added. This is determined by placing a drop of solution of ferrocyanide of potassium beside a drop of the supernatant liquid on a piece of filtering-paper, when, at the point of contact of the two liquids, a red color is produced as long as cupric sulphate is present. The supernatant solution of sulphate of zinc is decanted, the precipitated copper washed once with previously boiled water (free from air), and then treated with dilute hydrochloric acid to remove excess of zinc and oxide of zinc, until on its further addition hydrogen ceases to be given off. The copper is then completely washed with cold water which has been previously boiled to remove air; this process being best conducted in a flask by decantation so as to exclude air as much as possible, because the finely divided copper, while moist, is very readily oxidized. For this reason, also, the various steps in the process should be carried out without unnecessary delay. The moist magma, after draining it as completely as possible, is at once added to the proper quantity of nitrate of potassium (100 parts for every 250 parts of cupric sulphate employed), contained in a bright-iron vessel, and the mixture is then dried, with continuous stirring, over the open fire. The intimate mixture of metallic copper and nitrate of potassa is now ready for the final heating, which must, however, in this case, be considerably higher than with the mixture obtained by Persoz's method—nearly to redness. To accomplish this the authors find it best to proceed as follows: Portions of the mixture are introduced into a crucible, previously heated to dull redness, waiting each time until the portion added has melted and again become pasty before adding the next; this is continued until the crucible is about half filled, observing to scrape down the portions that adhere to the sides, so as to prevent further changes by too high temperature; the mass is then ladled out upon a stone slab or sheet iron to cool, and fresh portions of the

mixture are introduced as before. The black cooled mass is extracted by boiling water; the more or less alkaline liquid is neutralized with nitric acid, and evaporated to crystallization. The mother liquor contains some nitrate, but no other impurities.—Arch. f. Ph., March, 1879, pp. 245–252.

Nitric Acid.—It has hitherto been assumed that nitric anhydride cannot exist in the state of vapor, but is at once split into nitric oxide and hyponitric acid. Lunge has now found not only that it can exist in the gaseous state, but also that it may be heated up to 150°C . ($= 302^{\circ}\text{F}$.) before decomposition will take place.—Ph. Centralh., April 24th, 1879, p. 174.

Nitrate of Ammonium—Melting-point, etc.—Mr. Spencer Pickering finds the melting-point of this salt, which in textbooks is variously stated to be at 107.8° to 108°C ., to be incorrect. Experiments with the crystallized substances, dried at 100°C ., invariably gave its melting-point at 165° to 166°C ., whether it had been crystallized from water or from alcohol; it was also found that the amount of water retained by the moist crystals after being pressed between blotting-paper (about 0.55 per cent.) did not lower its melting-point more than 3°C . Nitrate of ammonium dissolves easily in alcohol, but is much less soluble in this liquid than in water. From either solution it is deposited on cooling or on evaporation in anhydrous crystals, which deliquesce only when exposed to very moist air. Exposed to air under ordinary conditions it may absorb from 0.06 to 0.15 per cent. of moisture, while when exposed to air perfectly saturated with moisture it may absorb 14 per cent., and even as high as 32 per cent. of moisture, and become partially liquefied. On being heated above its melting-point it begins to decompose into nitrous oxide and water at about 185°C ., and not at 250°C ., as is stated in Miller and elsewhere.—Ch. News, December 6th, 1878, p. 267.

Nitre—New Deposits in Chili.—The reports of nitrate of sodium and guano, and of silver and copper in the northern extremity of the Chilean territory, which have been circulated frequently for some time past, have at last decided the Chilean Government to send out commissions in its own interest, one to explore, as far as possible, the natural riches of the, at present, inaccessible desert of Atacama; the other to study the means of communication by which these riches could be made marketable. The Chilean Government has now made known the results of these

two exploring commissions, giving the information just as it was received, and publishing, in the form of two pamphlets, the full text of the reports addressed by the commissioners to the Minister of the Interior. The most important of these documents is undoubtedly that of M. Pissis, who has been enabled to verify the existence of abundant natural riches in the desert of Atacama; and although the deposits of nitrate of sodium found by the commission were extensive, it may reasonably be conjectured that they are only a small portion of those which exist. The same may be said of the guano and of the silver and copper. The points of attack having been determined, the Chilean Government has undertaken the erection of the necessary works at the ports Blanco Encalada and Taltal. The construction of roads to the nitre fields will shortly commence.—Ph. J. Trans., July 13th, 1878, p. 27.

SULPHUR.

Sulphur—Production on the Pacific Coast.—Mr. Richard V. Mattison has had opportunity to witness the mining and purification of sulphur in California and Nevada. In some of the mines, particularly in Nevada and Montana, the sulphur occurs frequently in a state of remarkable purity; but more generally it requires purification. The impure sulphur deposits of the Pluton Mines, Pluton Cañon, California, occur in the form of a gray ashy mass of easily pulverulent sulphur crystals. The “purifier” is composed of wrought iron, about the thickness of boiler-iron, riveted together, and shaped not unlike a percolator. It has a diameter of about four feet and a height of probably eight, and a capacity of about a ton of charge. The bottom is perforated and funnel-shaped, while the top is covered by a wrought iron lid with bolt attachments. The charge of crude sulphur, having been properly dried, is dumped into the purifier, a double thickness of heavy gunny-cloth having first been carefully spread over the perforated bottom of the cylinder. The lid being securely attached, superheated steam is turned into the purifier through a tube in the side of the cylinder, and the sulphur, gradually melting, settles to the bottom, where it is drawn off by means of a stopcock, either into moulds or boxes. The whole apparatus swings upon a pivot, and the work of withdrawing the charge can be effected in a few moments.

At Sulphur Banks Mine, near Lukeport, the sulphur occurs

with cinnabar, the whole in the form of a dark-gray ash, entirely free from rock or sulphur crystal. The sulphur may be procured by the process above given, or it is subjected to distillation in an ordinary cinnabar furnace, whereby the mercurial vapor and sulphur are passed into a receiver. In this the sulphur is liquefied by superheated steam, and the mercury passes into a second receiver and is there condensed.—A. J. Ph., January, 1879, p. 17.

Sulphur—Solubility in Formic Acid, etc.—It has already been shown by Leo Liebermann that conc. acetic acid is capable of dissolving considerable quantities of sulphur. Experiments since made by Dr. G. Vulpius show that formic acid also possesses solvent action upon this body, but that the quantity dissolved is relatively insignificant, being in an acid of sp. gr. 1.220, only 1 part of sulphur in 2800 parts, at 100° C. (= 212° F.). Upon cooling the greater part of the sulphur is again deposited. Stearic acid, on the other hand, is capable of dissolving considerable quantities of sulphur, and the solution formed may be diluted with warm alcohol without giving rise to precipitation.—Arch. f. Ph., September, 1878, p. 229.

Sulphur—New Method of Quantitative Determination.—O. Fahlberg and M. W. Iles find that if sulphur is fused with a sufficient excess of alkali it is converted entirely into sulphite, and not into a mixture of hyposulphite and sulphide, and if still more alkali is present the result is a mixture of sulphite and sulphate. To oxidize the sulphite to sulphate the authors apply bromine. They have successfully applied this analytical principle to organic sulphur compounds, to free sulphur, and metallic sulphides. The fusion of sulphur or a metallic sulphide with potassa yields a sulphite without any loss, which is then oxidized by means of bromine and hydrochloric acid, forming sulphuric acid, which is then determined in the ordinary manner. Where metallic oxides are separated after the fusion in an insoluble state, they are removed by filtration before the bromine and hydrochloric acid are added. Sulphides of arsenic, antimony, zinc, etc., all yield, after melting, a fusible mass, whilst in case of sulphides of iron and copper these metals are left behind in the state of oxides. Even in pyritic silicates the sulphur can be accurately determined in this manner. Care must be taken that not less than 25 grams pure caustic potassa is taken to every 0.1 gram of sulphur supposed to be present.

The operation is performed in a silver crucible, and the fusion is continued until the mixture becomes tranquil, say from fifteen to twenty minutes, or till vapors of alkali begin to condense along the upper part of the crucible, which after use shows a clean surface if sufficient alkali has been used. When cold the mass is dissolved in cold water, freed from oxides, etc., by filtration, mixed with from 75 to 100 cc. bromine-water, and hydrochloric acid added till a distinctly acid reaction is obtained. Heat is then applied till the liquid is colorless.—Ber. d. d. Ch. Ges., No. 10, 1878; in Ch. News, October 25th, 1878, p. 210.

Hyposulphurous Acid—Reagents.—Haugk finds that ferric chloride, or sesquichloride of ruthenium, iodide of starch, and permanganate of potassium, are very sensitive reagents for hyposulphurous acid and its compounds,—all of these reagents being reduced by the action of the acid. When 10 cc. solution of permanganate of potassium* are mixed with an equal volume of solution of hyposulphite containing 1 in 40,000, the color is immediately changed to blue-green; with 1 in 60,000 to violet-blue; with 1 in 100,000 to lilac, and by greater dilution into light blue. Iodide of starch is immediately decolorized.—Ph. Centralh., January 16th, 1879, p. 20.

Fuming and Anhydrous Sulphuric Acid.—According to J. A. W. Wolters, who has been granted a patent in Germany, fuming and anhydrous sulphuric acid may be obtained by carefully melting bisulphate of sodium, mixing this with a corresponding quantity of dehydrated sulphate of magnesium, and subjecting to distillation. The latter takes place at a moderate temperature. The residue in the retort may be used for the next preparation of anhydrous sulphuric acid.—Ph. Centralh., February 13th, 1879, p. 60.

Sulphuric Acid—Boiling-point at Different Concentrations.—G. Lunge describes the method by which he obtained the results given in the appended table. The only table hitherto constructed to show the boiling-points of sulphuric acids of different concentrations is that of Dalton in his "New System of Chemistry;" but as his results are to some extent inaccurate, the author has re-determined these constants:

* The strength of this solution is not given.

Observed volume weight.	Tempera- ture — ° C.	Volume weight reduced to 15° C.	Correspond- ing per cent. of H ₂ SO ₄	Observed boiling- point. — ° C.	Barometer reduced to 0° C.
1.8380	17.	1.8400	95.3	297.	718.8
1.8325	16.5	1.8334	92.8	280.	723.9
1.8240	15.5	1.8245	90.4	264.	720.6
1.8130	16.	1.8140	88.7	257.	726.0
1.7985	15.5	1.7990	86.6	241.5	720.1
1.7800	15.	1.7800	84.3	228.	720.5
1.7545	16.	1.7554	81.8	218.	726.0
1.7400	15.	1.7400	80.6	209.	720.6
1.7185	17.	1.7203	78.9	203.5	725.9
1.7010	18.	1.7037	75.3	197.	725.2
1.6750	19.	1.6786	77.5	185.5	725.2
1.6590	16.	1.6599	73.9	180.	725.2
1.6310	17.	1.6328	71.5	173.	725.2
1.6055	17.	1.6072	69.5	169.	730.1
1.5825	15.	1.5825	67.2	160.	728.8
1.5600	17.	1.5617	65.4	158.5	730.1
1.5420	17.	1.5437	64.3	151.5	730.1
1.4935	18.	1.4960	59.4	143.	730.1
1.4620	17.	1.4635	56.4	133.	730.1
1.4000	17.	1.4015	50.3	124.	730.1
1.3540	17.	1.3554	45.3	118.5	730.1
1.3180	17.	1.3194	41.5	115.	730.1
1.2620	17.	1.2633	34.7	110.	732.9
1.2030	17.	1.2042	27.6	107.	732.9
1.1120	17.	1.1128	15.8	103.5	732.9
1.0575	17.	1.0580	8.5	101.5	735.0

—Ph. J. Trans., August 10th, 1878, p. 104; from J. Chem. Soc. Ber. d. d. Ch. Ges., July, 1878.

Mineral Acids—New Method of Determination in Various Commercial Products.—P. Spence and A. Esilman base a new method for the determination of free mineral acids upon the fact, that when to solutions of ferric acetate a mineral acid is added the decided yellow color, which it has even when dilute, is immediately discharged. The reagent is prepared by dissolving 10 parts iron-alum and 8 parts crystallized acetate of sodium in 100 parts of dilute acetic acid containing 2 per cent. of acetic anhydride. The method is particularly suited for testing the alum and salt cake of the alum and soda manufacture, etc. 200 grams of the substance are triturated with dilute acetic acid (same as above), and the test solution is then added until a distinct yellow color is retained by the mixture; it is then diluted with more of the dilute acetic acid to 100 volumes, and a portion is filtered into a test-tube for comparison. A portion of the test solution, equal to that employed previously, is now diluted to 80 volumes with the dilute acetic acid, and titrated with normal sulphuric acid until the liquid has assumed the same color as the first. The quantity of sulphuric acid so used corresponds to the quantity of free mineral acid in the sample.—Ph. Centralh., July 25th, 1878, p. 277.

SELENIUM.

Selenate of Ammonium—Action of Heat.—C. A. Cameron and E. W. Davy have found that neutral selenate of ammonium loses some of its ammonia and becomes acid at 100° C., or perhaps below. The selenate of ammonium was prepared by saturating a dilute solution of selenic acid with carbonate of ammonium and evaporating the solution to dryness, when, in spite of an excess of carbonate of ammonium or ammonia, the residue possessed an acid reaction. The residue was repeatedly dissolved and evaporated with an excess of the carbonate alkali, but nevertheless the residue in each case proved acid. On the temperature being raised to 180° C. (= 356° F.) minute quantities of ammonia-gas were evolved, which increased with the rise in temperature, an acid salt forming at the same time. At 250° C. (= 482° F.) the decomposition proceeded further, with separation of selenium and selenous acid, water and nitrogen being evolved.—Chem. News, 38, p. 133; in J. Ch. Soc., December, 1878, p. 933.

CHLORINE.

Chlorinated Lime.—Dr. J. Hurter has contributed an extensive memoir in "Moniteur Scientifique Quesneville," October, 1878. He examines the phenomenon of the absorption of chlorine in its variations with time, with the concentration of the gas, with the depth and extent of the layer of lime. Secondly, he inquires into the disturbing influences exercised by the gases mixed with the chlorine,—i. e., carbonic acid,—hydrochloric acid, and watery vapor, and the influence of the heat liberated during the absorption. As concerns the action of time, and of the extent of the layer of hydrate of lime, he finds that chlorine is absorbed with a speed which rapidly increases, and that in equal times the proportions of gas absorbed are as the surfaces exposed. Hence he concludes that the depth of the stratum of lime has no influence on the absorption, the chlorine in equal times penetrating to an equal depth. The humidity of the hydrate of lime has at first little influence on the rate of absorption. He gives the following formula:

$$s = 0.305 + 0.588 \sqrt{P t} - 0.145,$$

where s signifies the depth of the stratum, which in t hours is converted into chloride of 36 degrees by a chlorine whose degree

of concentration is expressed by p. By means of this formula it is easy to calculate the yield of the chambers hitherto used. The influence of the foreign gases he finds very injurious. He holds that the chloride of lime is a peculiar compound, not containing chloride of calcium ready formed.—Ch. News, November 8th, 1878, p. 232.

Chlorinated Lime—Analysis and Hygroscopicity.—Mr. George Whewell has made the following experiments with an unsatisfactory sample of commercial bleaching powder, which had been found to absorb moisture very rapidly: The rate of absorption was determined by exposing 100 grains to the atmosphere of the laboratory and weighing every two hours during the day. In 24 hours it absorbed 25 per cent. of moisture; in 48 hours 41 per cent.; in 72 hours 52.3 per cent.; in 96 hours 64.9 per cent.; and in 103 hours 69 per cent. of moisture had been absorbed, the substance now left being in a liquid condition. The sample was sold as containing 35 per cent. of available chlorine, but was found to contain only 28.6 per cent. Its percentage composition was: Chlorine, 58.13; calcium, 30.88; difference (oxygen, etc.), 10.99. The calcium was determined as carbonate, and the total chlorine as chloride of silver.—Ch. News, February 21st, 1879, p. 80.

Chlorinated Lime and Sal Ammoniac.—The formation of Dulong's explosive oil, chloride of nitrogen, when strong chlorinated lime and sal ammoniac are brought in contact, is well understood. Th. Salzer has recently again drawn attention to this substance. He finds that when chlorinated lime and sal ammoniac, both perfectly dry, are shaken together in a small flask (or test tube), copious nebulous vapors are produced and the mixture becomes quite warm. The gaseous matter may be collected over water, and may explode without apparent cause. Salzer regards the hypochlorite of ammonium formed to be the explosive body, and is evidently of the opinion that ammoniacal vapors alone may in contact with chlorinated lime produce an explosive compound, since he warns against the admission of such vapors to the rooms where the chlorinated compound is stored. It seems probable that the explosions of chlorinated lime, which occurred several years ago, are attributable to this cause.—Ph. Centralh., February 20th, 1879, p. 74.

BROMINE.

Hydrobromic Acid—Extemporaneous Preparation.—Dr. Hager gives the following formulas for preparing a 10 per cent. hydrobromic acid extemporaneously, an acid of such strength being, in his opinion, most suitable :

1. 10.0 bromide of potassium are dissolved in 50.0 distilled water, 12.5 powdered tartaric acid is added, the mixture is well shaken, and then mixed with sufficient alcohol to make the whole weigh 80.0. The mixture is then placed into cold water, to facilitate the deposition of bitartrate of potassium, after which it is filtered. The yield is about 65.0. The objection to this process is that a portion of the bromide fails to be decomposed, and that the liquid consequently contains portions of bromide, tartaric acid and alcohol.

2. 15.5 bromide of potassium are dissolved in 30.0 distilled water, the solution is mixed with 38.0 diluted sulphuric acid of sp. gr. 1.115, the mixture placed in cold water, and 40.0 alcohol of 90 per cent. is added. After standing two hours the mixture is filtered through glass-wool, and the saline mass remaining on the filter washed with 10.0 alcohol of 45 per cent. The alcohol is then carefully distilled off, or evaporated in a porcelain capsule, at a temperature not exceeding 60° to 80° C. (= 140° to 176° F.) until the liquid weighs 100.0. If it weighs less it is brought to that weight with distilled water. This process yields a 10 per cent. acid and is far to be preferred to the first mentioned. At the temperature named only traces of hydrobromic acid are vaporized with the alcohol.—Ph. Centralh., July 18th, 1879, p. 265.

Hydrobromic Acid—Liberation of Bromine during Preparation.—Mr. E. Gregory having prepared hydrobromic acid by the extemporaneous formula given in Proceedings, 1877, p. 245 (water, 16 ounces ; bromide of potassium, 2 drachms, 320 grains ; tartaric acid, 3 drachms, 160 grains), observed that on mixing the solutions a sherry wine color was developed. At first he was inclined to attribute this to the presence of iron, but on subsequent experiments he found the coloration to be due to the liberation of bromine, and that this liberation always occurs when the bromide solution is poured into the solution of the acid, while if the order is reversed no liberation of bromine takes place.—Can. Phar. Jour., August, 1878, p. 2.

IODINE.

Iodine and Bromine—Extraction from Kelp.—Professor Robert Galloway has had facilities for becoming acquainted with the manufacturing processes followed for the extraction of iodine, bromine, and the potash salts from kelp, and communicates an interesting paper on the subject. The description in works on chemistry of these processes are very meagre in a manufacturing point of view, important details being altogether omitted. Of the many methods that have been proposed for the extraction of the two metalloids, iodine and bromine, from the ash of seaweeds, the one that is ascribed to Wollaston appears to be exclusively followed in the United Kingdom. By this method they are set free from the metals with which they are combined by the addition of sulphuric acid and peroxide of manganese to the mother liquor which remains after the extraction, as far as practicable, of the sulphate and chloride of potassium, and what are termed the kelp salts, which are a mixture of the sulphate, carbonate, and chloride of sodium. The author criticises this process, and concludes that it is unsuitable, inasmuch as it fails to extract all the iodine and bromine, while a considerable quantity of potash salts, as well as all of the sulphuric acid employed in the process, is wasted. Chlorine is the agent, out of the many proposed as substitutes for peroxide of manganese and sulphuric acid, that he would recommend, but under conditions somewhat different from those he has seen described; this difference in the conditions would render the process more exact, and better results in every respect would be obtained. The following are the author's suggestions: The kelp solution should be made neutral by the addition of sulphuric acid before adding an aqueous solution of chlorine; and, indeed, even before evaporating to obtain the last crop of crystals of chloride of potassium the liquid should be nearly neutral, so as to get rid of clay, which is always present in kelp solution, and renders it somewhat viscid. Having neutralized the liquor exactly, it is placed in a graduated vessel, and the amount of chlorine-water necessary determined by adding a portion of the liquor to bisulphide of carbon and adding of the chlorine-water to be used until the violet color disappears. This determines the quantity of chlorine-water necessary to convert the iodine into pentachloride, and only one-sixth of that quantity calculated for the whole quantity of liquor will be necessary. The

iodine is precipitated, a small proportion remaining in solution, which may be removed by bisulphide of carbon. The precipitated iodine must be subsequently sublimed. Instead of precipitating altogether with chlorine-water, and thereby largely increasing the bulk, a portion might be first precipitated by chlorine-gas, and the remainder by chlorine-water as described. After that bromine is precipitated with similar precautions, and in a like manner.—Chem. News, September 20th, 1878, p. 146.

Iodine—Manufacture from Seaweeds in France.—The exhibit of iodine products and the materials which contribute to its source in the case of Messrs. Pellieux and Mazé-Launay, of Kerhoun, Finistère, while exceedingly fine, eclipsed all others at the Paris Exhibition in interest by the information given as to the means of obtaining them. Under "Algæ," in this report, reference has already been made to the seaweeds employed by this firm, and the causes which may affect the yield of iodine. The model of a continuous furnace for the incineration of fresh weed is exhibited, by which, it is claimed, the loss of a considerable quantity of iodine that takes place during the ordinary process is avoided. The seaweeds are introduced into this furnace in the wet state, and fall by their own weight upon a series of gratings successively until they arrive at last at the incinerating hearth sufficiently dry to inflame and burn to ash; the combustible gas given off is utilized as a source of heat, and by thus making the weeds contribute fuel for their own incineration only one pound of coal is used in driving off sixteen pounds of water. The advantage in this treatment is illustrated by two specimens of kelp made in the laboratory from eighteen kilograms of *Laminaria digitata*, divided into two parts, so as to present an analogous composition, and treated differently. One sample of the weed, burnt without previous drying, yielded 477 grams of kelp, containing 8.238 grams of iodine; the other, previously dried by exposure in the open air, gave only 130 grams of kelp, containing but 0.940 gram of iodine.

It is also said to have been discovered recently that the yield of iodine is favorably influenced by allowing the fresh weeds to undergo a moderate fermentation before incineration. This is supposed to be due to a change that takes place in the molecular grouping, by which iodine existing in the fresh weed as a volatile compound combines with a fixed base, and is then not so readily lost in the incineration. In the presence of salts of soda

and potash the nitrogen of the fresh organic matter is converted during incineration partially into cyanides and partially into ammoniacal salts, together with a little iodide of cyanogen, which is volatile. But when, by incipient fermentation or putrefaction, the nitrogen of the fresh weed has been converted into ammonia, and the sulphur of the organic matter commences to form sulphides and sulphhydrates of potassium, sodium, and calcium, the iodide of cyanogen is decomposed by the sulphurous acid and the sulphhydrates; the ammonia is liberated and replaced by fixed bases, and the iodides of cyanogen and ammonium are definitely converted into iodides of sodium, calcium, and especially potassium, which are not decomposed by heat. In practice, therefore, fermentation is now induced in the seaweeds before commencement of the drying. They are first thrown on to a platform, and allowed to drain during five days; on the sixth day they are spread out in a layer of about twenty to twenty-four inches thick on a second platform, where fermentation quickly commences, and in about forty-eight hours it has proceeded far enough to allow of incineration without loss of iodine. They are then passed on to a third platform, from which the furnace is supplied. During these operations they lose in moisture about 45 per cent. of their weight, or half the water they contain originally, that probably representing the quantity lost during the ordinary operations of drying. From 15 to 20 per cent. of this is driven off as vapor by the heat developed during fermentation; the remainder drains off. The liquor draining from the weeds on the first platform is not preserved, as it contains no iodine; but that from the second and third platforms is partially evaporated, then mixed with the tar and other empyreumatic products of combustion, and run into the calcination furnace together with the weeds. Operating in this way, and exercising great care in the selection of the weeds used, an average yield of 1000 kilograms of kelp, containing 10.5 kilograms of iodine, is obtained from 12,600 kilograms of fresh undried weed. As compared with kelp obtained in the ordinary way, it is claimed that this kelp is twice as rich in potash salts, and three times as rich in iodine.—“The Paris Exhibition,” in Ph. J. Trans., December 14th, 1878, pp. 486, 487.

Iodine—South American Production.—Dr. G. Langbein states that the processes in use for separating iodine from the mother liquors of the nitre refineries in South America may be divided into three classes: (1.) The liquors, without previous concentra-

tion, are mixed with a quantity of sulphate of sodium, corresponding to the iodine present; the iodine separated is collected in linen filter-bags, washed, pressed, and sublimed. (2.) The mother liquors are treated with sulphite and bisulphite of sodium till the precipitated iodine is converted into hydriodic acid, which is then precipitated as cuprous iodide by a solution of cupric sulphate and sulphite of sodium. (3.) The iodine in the mother liquors is concentrated by fractional evaporation and crystallization, and the iodine, mixed with a proportionate quantity of sulphite or bisulphite of sodium, is recovered by distillation from the acidified liquid.—*Die Chem. Industrie*, No. 1, 1879; in *Ch. News*, April 18th, 1879, p. 172.

Iodide of Potassium—Manufacture.—E. Schering has communicated an interesting paper on the manufacture of iodide of potassium. Three methods are employed by the manufacturers:

1 Double decomposition between iodide of barium (obtained from sulphide of barium and iodine) and sulphate of potassium.

2. Addition of iodine to solution of potassa, and melting of the dried mass with charcoal.

3. Double decomposition between ferrous iodide and carbonate of potassium.

All three methods may give satisfactory results, the advantages or disadvantages depending on purely local causes. In the first method the production of sulphide of barium of high percentage is somewhat difficult, and the unavoidable generation of HS occasions much inconvenience; the washing of the sulphate of barium also consumes much time. The advantages are that the sulphate of potassium is both cheaper and purer than carbonate, that the sulphate of barium may again be used for the production of sulphide, and that clear, colorless solutions of the iodide of potassium are readily obtained.

By the second method concentrated solutions of the salt may at once be obtained without trouble; but the saturation of the potassa solution and its subsequent evaporation are so troublesome, and consume with the subsequent melting so much fuel, that the author has finally preferred the third method.

In this the ferric iodide is prepared both rapidly and with ease, and the solution is directly precipitated with carbonate of potassium; the dense precipitate is easily washed and the dilute washings may be used in a subsequent operation.

For the production of the handsome cubical porcelainlike crys-

tals, it must be observed by the first method that no sulphur compound remains in the solution, in the presence of which glassy imperfect crystals are obtained; while sulphide of iron, which appears to be soluble in iodide of potassium, communicates a bluish tint. If even a slight excess of iodine is employed for the decomposition of the sulphide, other metals contained in the latter will contaminate the iodide of potassium, and will render the crystals unsightly and even colored. By the second method, if the heating has not been uniform, iodate of potassium may be present; or, if sulphate of potassium was present, sulphide of potassium will contaminate the iodide. Both of these impurities must be removed before crystallization. The third method yields with care a perfectly pure solution of the iodide, from which the crystals may readily be obtained in the condition desired in commerce. Besides the impurities already mentioned, certain foreign salts (particularly sodium salts) prevent the formation of porcelainlike crystals. The conditions for the production of the latter are freedom of the solution from sulphur compound, proper alkalinity, a certain concentration, and slow cooling. Some manufacturers leave traces of iodate in the solution to secure the porcelainlike crystal, but such iodide of potassium is apt to become yellow in time. The presence of lead in the iodine used will occasion much trouble, since iodide of lead is soluble in the liquor, and cannot be completely removed by sulphhydric acid.—Ph. Centralh., February 27th, 1879, p. 88.

C. E. De Puy draws attention to an adulterated article of iodide of potassium. It was characterized by the irregular formation of its crystals, which were traversed in all directions by deep fissures and were easily broken with the fingers, while the odor was strong and offensive. Analysis proved the fraudulent article to be a mixture of 58.8 per cent. bromide and 32.9 per cent. iodide of potassium, the remainder being chloride and carbonate of potassium.—A. J. Ph., February, 1879, p. 76.

Iodide of Iron and Iodide of Ammonium—Preparation of Stable Compounds.—All previous processes proposed for preventing the alteration of ferrous iodide, or of iodide of ammonium, being more or less defective, C. Pavesi recommends the use of *albumen* for this purpose. He prepares unalterable iodide of iron as follows: Protoiodide of iron is prepared in the usual manner from 1 part of pure iodine and sufficient iron-filings (or wire); when the

solution has acquired the greenish color, 3 parts of dry soluble egg albumen and 5 parts of mannite are added; the whole is heated to a temperature of about 104° F., and when solution has taken place filtered through paper. The filtrate is evaporated at a very gentle heat, in a shallow, capacious capsule, to perfect dryness. The residuary scales are detached with an iron spatula and preserved in glass-stoppered bottles. Thus prepared the salt is in brilliant, pale-yellow, odorless scales, very soluble in water, and giving no reaction of free iodine with starch-paper.

Iodide of ammonium may be obtained similarly in permanent form when the presence of albumen and mannite are not objectionable.—New Rem., January, 1879; from *Giornal. de Farm. di Torino*.

FLUORINE.

Fluorine—New Volumetric Method.—Mr. Samuel L. Penfield has made the well-known reaction — $3\text{SiF}_4 + 2\text{H}_2\text{O} = 2\text{H}_2\text{SiF}_6 + \text{SiO}_2$ — the basis of a volumetric determination of fluorine, estimating the quantity of hydrofluosilicic acid formed from a given weight of fluoride by means of a standard alkali solution. It is impossible to titrate the hydrofluosilicic acid directly, because as soon as an alkaline reaction is reached the silico-fluoride is decomposed and an acid reaction is indicated, which change goes on slowly. But when barium chloride and an equal volume of alcohol are added to the solution, barium silico-fluoride is precipitated from the solution, and an equivalent amount of hydrochloric acid is liberated, which can be titrated; by this means, using litmus as an indicator, the author was enabled to get some very satisfactory results, but the turbidity caused by the barium silico-fluoride interfered with the change of color of the litmus. He finally found that potassium chlorido could be substituted with advantage for the barium chloride, if an equal volume of alcohol was added to the mixture, thereby causing the complete precipitation of the silico-fluoride of potassium in the form of a transparent precipitate, in which condition it does not interfere with the color reaction. The author gives the details of his method, and some results obtained with it, for which see *Chem. News*, April 25th, 1879, pp. 179, 180.

PHOSPHORUS.

Phosphorus—Solubility in Acetic Acid.—Dr. G. Vulpius finds

that phosphorus may be dissolved to the amount of very nearly 1 per cent. in the concentrated acetic acid of the Phar. Germ. The solution is effected slowly and with difficulty in the cold, but by the aid of heat is much more rapid. The quantity of phosphorus dissolved is dependent on the strength of the acid. A few drops of water added to a saturated solution will produce strong turbidity, and on further addition an abundant deposit of phosphorus. A curious difference is observable between the original solution and that to which water has been added. The latter phosphoresces quite strongly in the dark, while there is scarcely any phosphorescence observable in the original solution. This difference appears to indicate that oxidation takes place very slowly in the actual solution, and is much more rapid in solid phosphorus suspended in a finely divided condition.—Arch. f. Ph., July, 1878, p. 38.

The results with acetic acid have induced Dr. Vulpius to experiment on the solubility of phosphorus (and also of sulphur) in other members of the fatty acid series. The solubility in *formic acid* was found to be very slight, 1 part of phosphorus requiring at least 10,000 parts of formic acid, and the solution is scarcely phosphorescent. Experiments are to be made yet with propionic, butyric acid, etc., which in all probability have greater or less solvent power. One of the higher homologous acids, *stearic acid*, was found by the author to dissolve considerable but undetermined quantities of phosphorus and of sulphur. The solutions can be mixed with warm alcohol without a precipitation of the dissolved phosphorus or sulphur, and, inasmuch as the alcoholic solution of phosphorated stearic acid gelatinizes on cooling, it might find application in an opodeldoc-like form.—Arch. f. Pharm., 1878, p. 229.

Phosphoric Acid—Determination as Ammonic-phosphomolybdate.—R. Finkener has made the following observations in reference to this method: Hydrochloric and nitric acids hinder or delay the formation of the yellow precipitate, whilst dissolved molybdic acid promotes or accelerates it. Hydrochloric acid in the solution acts more powerfully than nitric acid, and ammonic nitrate more powerfully than ammonic chloride. The author's solution contains, per liter, 33 grams molybdic acid, 141 grams N_2O_5 , and 19.4 grams NH_3 . When precipitating phosphoric acid the quantity of free nitric acid must always be more than enough to prevent the

formation of a precipitate in the absence of phosphoric acid, but a considerable quantity of nitrate of ammonia may be dissolved in the liquid. In ordinary cases the phosphoric acid will be totally precipitated in less than twelve hours if so much molybdic mixture is added as to make up four times the volume of the phosphoric solution, and if in every 100 cc. of the mixture there are dissolved 25 grams of nitrate of ammonium. For washing the precipitate a strong (20 per cent.) solution of nitrate of ammonium is employed, to which, at first, one-thirtieth of its volume of nitric acid is added. The washing is completed when the washings are no longer colored by potassium ferrocyanide. The precipitate may be brought into a condition fit for weighing by the following operations: After removing most of the ammonic nitrate by means of water, the contents of the filter are washed into a weighed porcelain crucible. Anything adhering to the paper is dissolved in a little warm dilute ammonia, the solution is concentrated by evaporation, nitric acid is added in excess, the whole is quickly poured into the porcelain crucible, the liquid expelled by evaporation, and the nitrate of ammonium driven off by a flame moderated by wire gauze. The residue is hygroscopic, and must be cooled over sulphuric acid and quickly weighed in the covered crucible.—Ber. d. d. Ch. Ges., No. 13, 1878; in Ch. News, January 24th, 1879, p. 42.

BORON.

Borax.—E. De Cyon asserts that food preserved with borax is perfectly innocuous and preserves all its nutritive qualities.—Compt. Rend., December 30th, 1878; in Ch. News, January 31st, 1879, p. 54.

G. Le Bon, in contradiction to the above, reasserts the injurious qualities of borax when used to preserve food, and especially meat. Borax taken in small successive doses is a poisonous agent, the use of which should be strictly prohibited in the preservation of alimentary substances.—New Rem., March, 1879, p. 84; from Chem. News, January 3d, 1879.

Borofluoride of Potassium—Application as a Flux.—Professor Stolba, in view of the fact that this compound melts at a faint-red heat to a thin liquid, while at a high heat it emits vapors of fluoride of boron, which dissolve certain metallic oxides, has tried its availability as a flux, and finds that it possesses decided advan-

tages as such for soldering various metals : wrought and cast iron, steel, brass, gold, and silver. It possesses many advantages over borax, flowing more readily and quietly, without frothing. It is used like borax, but the evolution of vapors of fluoride of boron at a high heat necessitates that the operation be performed under a good flue, or in a situation exposed to a good draft. The compound is prepared by melting kryolite, boric acid, and sulphuric acid together. Mixed with an equal quantity of borax it may, perhaps, still be used with advantage as a flux, and such a mixture is used by the author for cleaning platinum crucibles. Used alone the borofluoride adheres very tenaciously to the crucible ; in admixture with borax it is readily dissolved off.—*Zeitschr. Oest. Apoth. Ver.*, July 10th, 1878, p. 317.

SILICON.

Gelatinous Silica—An Inorganic Membrane.—F. Ullik has succeeded in attaching gelatinous silicic acid, precipitated by hydrochloric acid from a dilute solution of silicate of sodium, to glass, and by subsequent washing rendering it fit to act as a dialyzing membrane. This was prepared in two forms: (1) as a free membrane, 3 mm. in thickness, and (2) as a thin film (0.5 mm.), deposited upon a base of Swedish filter-paper. The author gives the details of some experiments made with these dialyzing agents.—*Ber. d. d. Ch. Ges.*, 11, pp. 2124–2128 ; in *J. Chem. Soc.*, March, 1879, p. 199.

Bottle Glass.—Dr. H. Macagno has examined the glass which composes the bottles used in different countries, and gives the result in an elaborate table, showing the sp. gr., chemical composition, solubility in water, degree of corrosion, and country in which produced. The results show that the French glasses are of superior quality, while the Rhine, Madeira, Malaga, and Xeres bottles seem to be of a very bad composition. In order of color the deep green takes the front rank ; the second, the white and common green ; the clear green, the red-brown, and the yellow-brown are the worst, and they must be regarded as easily dangerous to ordinary wines rich in potassium bitartrate. Regarding the chemical composition, it is concluded that this is not a sufficient character for judging of its quality. The amount of alkali or lime does not seem to indicate the resisting power of the glass to water or acids, which is the most important condi-

tion to wine keeping. The sp. gr. was determined by the ordinary processes; the *solubility in water* is given by the quantity of materials dissolved from 100 grams of the finely powdered glass by 5 liters of water boiling for an hour; the *corrosive degree* is ascertained by boiling in the same way with the addition of 0.33 per cent. of bitartrate of potassium to the water, and estimating the quantity of tartaric acid neutralized. An inverted condenser maintained the liquid volume constant in both these operations.—Ch. News, July 5th, 1878, pp. 5 and 6.

As about thirty hundredweight of slag are made for every ton of pig iron, the importance of utilizing this waste product is very obvious. In England slag has been turned to account in the formation of breakwaters, such as that at the mouth of the Tees. Bricks, paving-sets, concrete, and other articles are also made of it. Three millions of slag bricks, most of which go to London, are manufactured annually.—“Random Notes,” in Drug. Circ., February, 1879, p. 52.

New Material for Making Glass.—Hitherto the slag from iron blast furnaces has been utilized only for making what is known as “mineral wool,” though many attempts have been made to utilize it for other purposes, and among these for making glass, without success. A Mr. Britten has now succeeded in utilizing this material for glass, and also the heat from the furnaces, and a company has been formed in England to work his patent. The slag flows into a tank at one end, and is there mixed with the required ingredients for making glass, fused, and fined; it then flows through a bridge to the other end of the tank, where it is worked, and afterwards blown into bottles, etc. As the slag is melted it does not require so great a heat for the combination with the other substances, and also furnishes more than half the material of the glass. The natural tint of the product is greenish, but it can be bleached or colored at will. It can readily be seen that it will be cheaper for ironmasters to have glass-works attached to their own works, as the cost will not be so much as the always-increasing cost of ground on which to dispose of their slag.—Drug. Circ., January, 1879, p. 31; from Scient. Amer.

CARBON.

Diamonds.—Biballier has patented a process (in Germany) for decolorizing gray or blue diamonds. It consists in inclosing the

diamond air-tight in a mixture of chalk and powdered charcoal contained in a crucible, heating, and then allowing to cool slowly. —Ph. Centralh., February 16th, 1879, p. 66.

Lignite Coke—A Substitute for Boneblack.—According to F. Matthey, large quantities are at present prepared as a substitute for boneblack. The conversion of coal into coke takes place in iron retorts, while the gases evolved are collected and used as fuel under the retort. The coke is then ground up in a mill with water to a very fine powder, and is, after drying, ready for use. —Dingl. Polyt. J., 228, pp. 466–467; in J. Ch. Soc., October, 1878, p. 828.

Albuminated Animal Charcoal.—Purified animal charcoal is made into a paste with whites of eggs, spread in thin layers to dry, at a temperature of 95° F., then powdered, treated again with whites, dried, and repeated until the resulting product weighs five times as much as the original charcoal. It must be kept in well-stoppered bottles. To be used where clarifying and decolorization at the same time are wanted.—“Random Notes,” in Drug. Circ., April, 1879, p. 79.

Oxychloride of Carbon—Preparation.—E. Paterrio prepares this compound by passing a mixture of chlorine and carbonic oxide through a glass tube, 15 mm. in diameter and about 40 cm. long, filled with pellets of animal charcoal. In presence of this substance the combination of the two gases takes place with great rapidity, and without the aid of sunlight. It is, moreover, accompanied by considerable disengagement of heat, rendering it necessary to keep the tube continually cool. The combination is complete even when the current of gas is very rapid; and it is easy to obtain the oxychloride free from chlorine, and containing a slight excess of carbonic oxide, by regulating the stream of gas in such manner that the gas after combination shall be colorless. The oxychloride in this state serves well for the preparation of chloroformic ether, and for the greater number of reactions in which it is employed. If it is afterwards to be liquefied, it is best prepared with a slight excess of chlorine, which may be afterwards eliminated by known processes. By the aid of this mode of preparing oxychloride of carbon, it is easy to obtain in a day a kilogram of ethylic oxychlorocarbonate.—Gazz. Chim. Ital., 8, p. 233; in J. Ch. Soc., November, 1878, p. 853.

Sulphocarbonate of Potassium—Preparation.—In view of the

probability that this compound, which several years ago was recommended as most effective for the destruction of the *phylloxera* infesting grapevines, will find demand also for the destruction of the insects which infest ornamental plants, Professor John M. Maisch gives some general information regarding its character, and some methods of its preparation. Sulphocarbonate of potassium has the composition of carbonate in which the oxygen is replaced by an equal number of atoms of sulphur. To prepare it, monosulphide of potassium solution—prepared by passing HS into a solution of caustic potassa as long as the gas is absorbed, and afterwards adding an equal bulk of potassa solution—is shaken with carbon bisulphide in a glass-stopped bottle, with a temperature of 30° C. (= 86° F.); as the carbon bisulphide dissolves the liquid acquires a yellow, brown-yellow, or red-brown color, according to the concentration or purity of the solution. The compound obtained is sufficiently pure for the purpose above indicated. On careful evaporation of the solution at the temperature indicated yellow crystals of the hydrate are obtained, which at a somewhat higher temperature part with their water and leave the anhydrous compound.

Sulphocarbonate of potassium is very deliquescent, freely soluble in water, sparingly in alcohol, and has a cooling, afterwards pungent, and finally somewhat sulphurous taste. Its sparing solubility in alcohol, and the free solubility of monosulphide of potassium in that liquid, may be taken advantage of in preparing the compound if a very pure article is desired,—the sulphocarbonate forming a syrupy third layer when alcoholic solution of monosulphide of potassium and bisulphide of carbon are shaken together. Sulphocarbonate of potassium is also produced when a watery solution of caustic potassa and carbon bisulphide are agitated together; but carbonate of potassium is formed at the same time, and as this cannot be readily separated from the sulphocarbonate, the product is unsuited for the destruction of insect life. If *alcoholic* solution of potassa is substituted for *watery* solution in this last process, *sulphocarbovinat*e of potassium is formed. The acid of this compound is also known as *xanthonic*, *xanthic*, and *xanthogenic acid*. It was discovered by Zeise in 1822.—A. J. Ph., April, 1879, p. 181.

Carbonic Acid—Estimation in Presence of Sulphites or Subsulphites.—Good methods for the estimation of carbonic acid are abundant, but in the presence of sulphurous acid or its compounds they fail to give correct results. Pollaci obviates the difficulty by

using bitartrate of potassium to liberate the carbonic acid. When this is pure and exact in its composition (contains no free acid), it will liberate the carbonic acid from its compounds, while sulphites or subsulphites are not affected. A bitartrate suitable for this purpose is readily obtained by adding an excess of pure tartaric acid to an aqueous solution of pure tartrate of potassium, collecting the precipitated bitartrate upon a filter, and carefully washing it with alcohol until the free acid is completely removed. For qualitative examinations it is only necessary to place the carbonate and bitartrate in contact with water, when the carbonic acid given off may be readily recognized; the sulphite, if present, will subsequently give off sulphurous acid on the addition of sulphuric acid. The quantitative method takes the same course, care being taken that all of the carbonic acid be removed before liberating the sulphurous acid.—Ph. Centralh., September 5th, 1878, p. 341.

CYANOGEN.

Hydrocyanic Acid—Estimation.—Mr. Louis Siebold finds that Liebig's method for estimating the strength of hydrocyanic acid by means of decinormal solution of nitrate of silver gives perfectly accurate results if: (1.) The hydrocyanic acid is added to the solution of sodium or potassium hydrate, thereby preventing loss of the acid by vaporization; (2.) If the mixture of hydrocyanic acid and alkali is largely diluted before the nitrate of silver is added; and (3.) If the amount of alkali used is as exactly as possible that required for the conversion of the hydrocyanic acid into cyanide, as an insufficiency or an excess both affect the accuracy of the result. With an excess the results are too high; with an insufficient quantity they are too low. It is very difficult, however, to so adjust the proportions of acid and alkali as to obtain a perfectly neutral cyanide, since an alkaline reaction may be indicated by litmus in the presence of a considerable quantity of free hydrocyanic acid. Mr. Siebold has now found that an excess of alkali can be used in this process, and by the following modification perfectly accurate results obtained:

The acid is allowed to run from the pipette into an excess of solution of sodium hydrate; decinormal solution of nitrate of silver is then added drop by drop until a slight opalescence is produced, and, this point being attained, standard normal hydrochloric or sulphuric acid is added until the opalescence begins to increase, which does not take place until the whole of the free

alkali is neutralized. From experience he finds that for each cc. of standard mineral acid thus required 0.01 cc. should be deducted from the volume of the silver solution used, and the remainder calculated for HCy. In this process the cyanide of sodium and silver formed acts as an acidimetric indicator, and, indeed, it answers well for the purpose, for a single drop of free acid produces with it a very distinct precipitate of cyanide of silver.

The fact that in the absence of a sufficient quantity of soda the volume of silver solution required to produce a permanent precipitate only indicates that portion of the hydrocyanic acid which has been used up in the formation of cyanide of sodium, and that this determination of NaCy is in no wise affected by the presence of free hydrocyanic acid, renders this method applicable for the analysis of mixtures of the free acid and alkaline cyanides. Supposing the solution to be analyzed contained free hydrocyanic acid and cyanide of potassium, the volume of silver solution required to produce a permanent opalescence would show at once the quantity of KCy present. On now adding NaHO in slight excess, and continuing the titration until the opalescence is again produced, we find the quantity of free HCy; the results being quite exact.

The circumstance that alkaline cyanides can be accurately determined in the presence of free hydrocyanic acid affords, furthermore, a new alkalimetric method, which is particularly serviceable for the determination of alkaline carbonates, since carbonic acid does not in the least interfere with the accuracy of the reaction. From what has been said the following

New alkalimetric method will be easily understood. The weak solution of carbonate (or caustic alkali, if it is desirable to apply the method to such) to be tested—about 0.5 to 1 gram in 100 cc. of water—is mixed with 10 to 20 cc. of hydrocyanic acid of Scheele's strength (a decided excess), and the decinormal solution of nitrate of silver added drop by drop, stirring well all the time, until a permanent turbidity is produced. Each cc. of the solution required corresponds to 0.0138 gram K_2CO_3 , and to 0.0106 Na_2CO_3 .—Yearbook of Pharm., 1878, p. 515.

Hydrocyanic Acid—Determination in Bitter-Almond-water.—H. C. Vielhaber finds the method of Liebig by direct titration with nitrate of silver unsatisfactory, the end of the reaction being quite indistinct on account of the slow separation of the cyanide. He recommends the following as giving very accurate and rapid re-

sults: A quantity of the bitter-almond-water is rendered faintly alkaline by adding magnesium hydrate suspended in water; a few drops of potassic chromate solution are then added, and the mixture is titrated with $\frac{1}{10}$ normal solution of argentic nitrate, until the red argentic chromate formed no longer disappears. With careful manipulation it is possible to obtain results in which the limit of error does not exceed one drop of the silver solution. The magnesian hydrate does not act upon the argentic nitrate until all the chromic acid is united to the silver. It is kept ready for use in the form of well-washed magma in a well-stopped bottle.—Arch. f. Ph., November, 1878, p. 408.

Hydrocyanic Acid—Picric Acid a Reagent.—According to Hlasiwetz the addition of picric acid or a picrate, in proper proportions, to a solution of an alkaline cyanide, produces a magnificent red coloration, which is owing to the formation of an isopurpurate, or a species of artificial murexide. 0.01 gram of picric acid and 0.004 gram of cyanide of potassium, dissolved in 11 cc., still give a decided reaction; so also milk containing 0.0025 gram of hydrocyanic acid in 1 cc., etc. Guyot has observed that in the presence of mustard this reaction does not take place, while it did not fail to make its appearance under all other circumstances.—New Rem., October, 1878, p. 301; from Rép. d. Pharm.

Metallic Ferrocyanides—A Law Peculiar to them.—Antony Guyard observes that the hydrated oxides, as existing in their soluble salts, may be divided into two great groups, according to their behavior with aqueous ammonia:

1st. Oxides soluble in ammonia and in ammoniuretted ammoniacal salts, including, of course, the tartrate.

2d. Oxides insoluble, or very sparingly soluble, in ammoniuretted ammoniacal salts, but, on the other hand, soluble in tartrate of ammonium.

The first group is precipitated, and generally very completely, by ferrocyanide of potassium, whilst those of the latter group remain perfectly dissolved in the basic ammoniac tartrate.

The same author makes the following observation in regard to an

Oxyferrocyanide of Ammoniacal Copper.—The precipitate obtained by adding ferrocyanide of potassium to ammoniacal sulphate of copper, if washed and dried in the air at about 150° C. (= 302° F.), loses cyanogen and ammonia, absorbs oxygen, and

takes a violet tone. The material should be spread out in a thin layer, and stirred continually until the heat reaches 170°C . ($= 338^{\circ}\text{F}$.), when the reaction is complete. The color does not seem available, either in printing or in the pigment style in calico printing, and changes to blue and green respectively at higher temperatures.—Bull. de la Soc. Chim., May 10th, 1879; in Chem. News, June 20th, 1879, p. 277.

Sulphocyanide of Ammonium—Reagent for Silver, Chlorine, Bromine, Iodine, etc.—Volhard's method for the volumetric determination of silver—which is based upon the circumstance that in acid solutions of nitrate of silver containing ferric salt the characteristic red color of the latter is not produced until all of the silver has been precipitated as sulphocyanide—may also be applied to the determination of chlorine, bromine, and iodine. For all of these determinations a dilute solution of sulphocyanide of ammonium and a solution of a ferric salt (the author uses ferric alum) is required. The titre of the sulphocyanide solution is accurately established so as to correspond to a $\frac{1}{10}$ th normal solution of nitrate of silver (10.8 grams of chemically pure silver to a liter), and such a solution, for the preparation of which specific directions are given, will keep in well-stoppered bottles for years.

To determine silver, for instance, in an alloy, a quantity is dissolved in pure nitric acid, the nitrous acid is expelled, and the solution diluted with four times the quantity of water; 5.0 cc. of a cold saturated solution of ferric alum are now added, and the liquid is titrated with the sulphocyanide solution to faint but permanent redness. Each cc. of the reagent employed corresponds to $\frac{1}{1000}$ th equivalent $= 0.0108$ gram silver.

To determine chlorine and bromine it is necessary to titrate very dilute solutions; the substance is dissolved in 200.0 to 300.0 cc. of water, 5.0 cc. of the ferric alum solution are added, and sufficient nitric acid to destroy the color produced by the ferric salt; a measured quantity of $\frac{1}{10}$ th normal silver solution—in slight excess of the quantity absolutely required—is now added, and the mixture is then at once titrated with the sulphocyanide solution, facilitating rapid admixture by giving continued rotary motion to the contents of the beaker. The process is ended when the liquid has assumed a light yellowish-brown color, and retains the same after standing 10 minutes. The number of cc. of sulphocyanide solution deducted from the number of cc. of

silver solution previously added, gives the quantity of the latter required for the chlorine or bromine present, and the absolute quantity of these is obtained by multiplying the cc. of silver solution so ascertained by 0.00355 for chlorine and by 0.008 for bromine.

When iodine is to be determined the manipulation must be somewhat modified, because iodide of silver may, according to circumstances, carry down portions of the iodide undergoing examination, or of nitrate of silver. The iodide is dissolved in 200 to 300 times its weight of water, preferably in a stoppered flask, and the silver solution is then added. At first the liquid assumes a yellowish-white appearance and forms no deposit, but as soon as an excess of the silver solution has been added the whole of the iodide of silver subsides, after a little shaking, in the form of a curdy precipitate; the mixture is shaken for several minutes to insure the complete conversion of the iodide into the silver compound, 5.0 cc. of ferric alum solution are added, and the mixture is now titrated with sulphocyanide solution to distinct yellow coloration, which disappears on shaking. The alternate addition of sulphocyanide and agitation is repeated until the liquid retains a faint-yellow color. The calculation is then the same as in the case of chlorine and bromine, multiplying, of course, with the $\frac{1}{10000}$ th eq. of iodine.

The halogens contained in organic compounds may also be determined by the method, but it is necessary first to unite them to an alkali. This is best accomplished by heating a weighed quantity of the substances with 30 to 40 times its weight of a mixture of soda and nitro to redness, until the mass flows quietly. The cooled mass, which is readily removed from the crucible, is dissolved in water, an excess of silver solution is added, followed by nitric acid, and the mixture is heated on a water-bath to drive off nitrous acid present. When cool the mixture is titrated with sulphocyanide, etc., as in the cases above given.

Mr. J. Herz has recently subjected these processes to critical examination, and finds them in all cases to be strictly accurate and reliable.—Arch. f. Ph., April, 1879, pp. 322-329.

POTASSIUM.

Potassium—Lustre and Color.—As a lecture experiment Dr. Erckmann introduces a piece of potassium, of the size of a pea, into a small test-tube, heats to fusion, turns the glass round and

round till the metal congeals, and then seals up the tube. The greater part of the potassium is deposited on the sides of the tube as a specular metallic coating, resembling silver, and can be exhibited during lectures, etc. The other alkali metals may be similarly treated.—Chem. Zeit., No. 29, 1878; in Ch. News, August 9th, 1878, p. 71.

Potassa—Volumetric Assay.—Ad. Carnot suggests a volumetric method of determining potassa, which is closely related to his quantitative method previously published, in which the potassa is weighed as bismuth-potassic hyposulphite. The volumetric method depends upon the conversion of hyposulphite into tetrathionate, and is carried out as follows: A solution of hyposulphite of sodium, 200 grams to the liter, and a solution of 100 grams of subnitrate of bismuth in water, by the aid of hydrochloric acid in a liter of water and sufficient alcohol, are prepared. 1 gram of the substance, or as much as contains at least 0.7 gram of potassa, is dissolved in 10 cc. of water. In case the salt contains much sulphate, it is converted into chloride by chloride of calcium, and allowed to stand a few minutes to permit the sulphate of calcium to deposit completely. 10 to 20 cc. of the bismuth solution are then added, an equal volume of hyposulphite solution is added, and this is followed by 100 to 150 cc. of strong alcohol, the mixture shaken, and allowed to stand 15 minutes. The precipitate of the bismuth-potassic hyposulphite, mixed with sulphate of calcium, is transferred to a filter, washed thoroughly with alcohol until all traces of the reagents are removed, and is then dissolved, while on the filter, with cold water. A small quantity of starch solution and a few cc. of hydrochloric acid are now added, and the solution is titrated with a solution of iodine, the end of the reaction being indicated by the development of the iodide of starch color. The most convenient solution of iodine is one that indicates 0.01 gram of potassa to the cc., such a solution being obtained by dissolving 26.96 grams of iodine by the aid of an equivalent quantity of iodide of potassium in 1 liter of water.—Ph. Centralh., September 5th, 1878, p. 340.

Chlorate of Potassium—Alkalinity of Residuum after Heating to Redness.—"F. W." draws attention to the circumstance that a sample of chlorate of potassium, known to be free from nitrate of potassium, as evidenced by the diphenylamin test, yielded when heated on platinum foil a residue which reacted faintly al-

kaline to litmus. On searching the literature on the subject he found that Flückiger, in his "Pharmaceutische Chemie" (p. 649), says: "When heated in an open capsule to redness chlorate of potassium reacts faint alkaline." Neither Mohr nor Hager, nor in other works upon pharmacy, is any mention made of this reaction, and since the Ph. Helvetica requires such residue to be neutral the writer suggests that a proper correction be made.—Schweiz. Wochenschr. f. Ph., February 14th, 1879, p. 53.

Referring to the above observations of "F. W.," Dr. Hager maintains that any decided alkalinity of the residue obtained by heating chlorate of potassium to redness until gas ceases to be evolved, must be due to the presence of impurity. Such may be adhering bicarbonate of potassium, or nitrate of potassium. He found, however, that if the heating is continued half an hour beyond the time necessary for the expulsion of the oxygen, the residue will slightly change the red litmus (to a strong rose color), but bluing could not be observed. While he does not dispute the statement of Dr. Flückiger from a strictly chemical standpoint, he still maintains that the residue of heating is neutral pharmaceutically considered.—Ph. Centralh., March 6th, 1879, p. 102.

SODIUM.

Alkalimetry—Tropäolin a New Indicator.—W. v. Miller recommends the compound discovered by V. Witt, and known in commerce under the name of tropäolin, as an indicator in alkalimetry. The substance is changed by acids from yellow to carmine-red, while carbonic acid has no reaction. Furthermore, the yellow color is changed to red only by free acids, solutions of the metallic salts having no effect. It is possible, therefore, to detect small quantities of free acid in such salts. The advantages over litmus are obvious.—Ph. Centralh., July 11th, 1878, p. 260.

Alkalimetry—Extract of Orange-peel as Indicator.—As the indicators generally used in alkalimetical or acidimetical determinations furnish inaccurate figures in presence of somewhat larger quantities of ammoniacal salts, H. Borntræger communicates a new indicator, which is said to be free from this defect. Fresh orange-peel, cut in small pieces, is covered with a small quantity of absolute alcohol, and allowed to macerate for twenty-four hours. A yellow extract is thereby obtained, which may at once be used as reagent. But since the essential oil is troublesome in

presence of aqueous liquids, it is best to shake the extract with an equal volume of ether, when there will be formed two layers, an upper ethereal, and a lower, forming a dense, heavy liquid of about 1.014 sp. gr., which is to be separated and used as indicator.

This reagent, added to water, does not impart to it any color whatever, but alkalies produce a fine citron-yellow color. It should, however, be added that this reagent is inapplicable in presence of *free ammonia*, while it furnishes exceedingly accurate results in presence of ammoniacal salts. It can only be used in daylight, and in the examination of colorless liquids.—N. Rem., January, 1879, p. 19; from Zeitschr. f. Anal. Ch., 1878, p. 459.

A new alkalimetric method, particularly applicable to the estimation of alkaline carbonates, inasmuch as the presence of free carbonic acid does not in the slightest degree affect the reaction, is based by Mr. L. Siebold upon the circumstance that when a solution of an alkaline cyanide, containing hydrocyanic acid in excess, is titrated with decinormal nitrate of silver solution, the cyanide of the alkali first produces a double cyanide with the silver, and permanent opalescence does not take place until the whole of the alkaline cyanide has been so converted. (See Hydrocyanic Acid.) The method, which can of course also be applied to alkaline hydrates, is claimed by Mr. Siebold to have the following advantages:

1. The solution of alkaline carbonates does not require boiling, as the carbonic acid does not interfere.

2. The change from perfect clearness to an unmistakable turbidity, as produced by a single drop of the silver solution, is more striking than that of the color of litmus brought about by one drop of standard sulphuric acid.

3. As a decinormal solution is used the results are more accurate than those obtained by normal sulphuric or hydrochloric acids.

4. The result may be readily checked, without the necessity of operating on a fresh portion of the sample.

5. The chloride present in commercial alkaline carbonates can be estimated by the same process with but little additional trouble.

The check may be made by expelling the excess of hydrocyanic acid, adding a few drops of solution of chromate of potassium, and then again titrating with silver solution until the appearance of

a red color. The number of cc. of silver solution so used will be equal to that used in the first titration. In the presence of chloride, however, the number of cc. used will be greater than in the first titration, and the difference between the two exactly indicates the chloride.—Yearbook of Pharm., 1878, p. 518.

Alkalies—Determination of Potassa and Soda in Minerals.—W. Knop and J. Hazard have modified the method of determining alkalies in minerals, so as to avoid the errors that may result by the precipitation of the earths and metallic oxides with baryta, when acids are present which form soluble salts with the latter. A quantity of the mineral is dissolved (treated?) with fluoric acid, evaporated, the dry residue covered with sulphuric acid, and thus the greater part of the silicic acid removed as fluosilicic acid. The mixture is then heated until the sulphuric acid is all vaporized, without, however, approaching to redness. The residue is then moistened with 5 to 6 drops (to what quantity of mineral?) of conc. sulphuric acid, 150 cc. of water are added, and recrystallized barium hydrate is added to distinct alkaline reaction on litmus. The liquid is then filtered from the mixture of sulphate of barium, silicic acid, alumina, magnesia, and ferric oxide, and the latter are completely washed. The filtrate is now evaporated to dryness, a few grams of sesquicarbonate of ammonium being added when the liquid is down to about 200 cc. The perfectly dry residue is extracted 15 times with 20 cc. of water, filtered each time through a small filter of 3 to 4 cm. diameters into a platinum capsule, and evaporated to dryness. This dry residue is redissolved in 20 cc. of water, filtered through a new filter, washed, and again evaporated, and this process is repeated as often as any residue remains. Finally, the dry residue is neutralized with hydrochloric acid, the chlorides are evaporated to perfect dryness, weighed, and the potassium and sodium are then separated by means of platinic chloride.—Ph. Centralh., February, 1879, p. 64.

Alkalies—Separation from Alkaline Earths.—By the ordinary methods employed for the separation of alkalies from alkaline earths, a portion of the latter is very difficult to remove. Dr. Emil Pfeiffer finds that the complete separation may be accomplished as follows:

A weighed quantity of the substance is heated to moderate redness for the removal of any ammoniacal salts that may be present; it is then exhausted with water, the aqueous solution is boiled with barium or calcium-hydrate in excess to remove magnesia,

and the filtrate is boiled with ammonia and ammonium carbonate to remove the excess of precipitant, as well as other remaining alkaline earths. The filtrate from this precipitate, which must be washed with boiling water, is evaporated to a small volume; on cooling a small quantity of ammonia and a few small crystals of ammonium oxalate are added, and the volume is brought to a definite measure, say 20 cc. The liquid is allowed to stand over night, and then filtered through a dry filter into a dry flask, the difference in temperature, if any, being suitably adjusted. Fractional portions of this solution are then employed for the final determination of absolute weight and quality in the usual manner. Evaporated and heated to redness the alkalies are found free from alkaline earths as well as carbonates.—Arch. f. Ph., January, 1879, p. 52.

Soda—New Process for its Industrial Production.—H. B. Condy has patented the following process in England: By reduction sulphate of sodium is converted into sulphide, which is converted into bicarbonate by carbonic acid. The sulphhydric acid evolved is either burned to sulphurous acid, or passed into an iron solution, and with a view to the production of sulphur and sulphide of iron.—Ph. Centralh., July 18th, 1878, p. 267.

Bicarbonate of Sodium—Presence of Iron.—F. Schneider draws attention to the presence of traces of iron in the bicarbonate of sodium of commerce. Such bicarbonate, when used to make *solution of hypochlorite of sodium*, by the method of Biltz-Böttger, communicates to the liquid a faint bluish-red color, which the author attributes to sodic ferrate. The color appears to be tolerably permanent, and is not destroyed by boiling.—Schweiz. Wochenschr. f. Ph., January 17th, 1879, p. 19.

AMMONIUM.

Ammonia—Artificial Production.—M. Knab has obtained ammonia artificially as follows: A fixed acid containing three equivalents of oxygen (as silicic, boric, or aluminic acid or oxide) is obtained in a state of chemical subdivision by precipitation or otherwise. This is mixed with three equivalents of charcoal, and ground to an impalpable powder. The mixture is placed in a retort and heated to redness. Air is heated, and its oxygen is at the same time converted into carbonic acid and oxide by passing it over incandescent charcoal, and while still at a high tem-

perature it is driven through the heated mass of acid and carbon. The oxygen in the acid combines with the carbon, and the silicon, boron, or aluminium forms a nitride with the nitrogen of the air. Steam is afterwards forced through the nitride, and by double decomposition forms ammonia and silicic, or boric oxide, or alumina; the following being the equation: $\text{SiO}_2 + 3\text{C} + \text{N} = \text{SiN} + 3\text{CO}$. Then $\text{SiN} + 3\text{HO} = \text{SiO}_2 + \text{NH}_3$. As three equivalents of H are required to convert the N into ammonia, an oxide must be used which contains three equivalents of O.—Drug. Circ., January, 1879, p. 29; from Chemik. Zeit.

Solution of Chloride of Ammonium.—Referring to the observation of Leeds, that chloride of ammonium solution, when kept for a year or more, is partially decomposed with formation of nitrate of ammonium and fibrous organic formations, Dr. Hager states that such change must be attributed to impurity, probably of the distilled water, and that a solution known to be five years old, and kept during that period in a dark place, as had been the solution examined by Leeds, was free from products of decomposition.—Ph. Centralh., April 17th, 1879, p. 164.

Commercial Ammonium Carbonate—Composition.—H. Vogler has determined the composition of the clear hard pieces and of efflorescent crust. The clear hard portion gave results corresponding to the formula $\text{NH}_4\text{O}, \text{HO}, 2\text{CO}_2 + 2 (\text{NH}_3, \text{CO}_2)$. A portion of the same salt was then exposed under a bell jar over sulphuric acid for 15 days. The residue, amounting to 32.6 per cent. of the original quantity had a composition corresponding to the formula, $\text{NH}_4\text{O}, \text{HO}, 2\text{CO}_2$. This effloresced salt is not, however, as is generally assumed, permanent in the air, but slowly evaporates at the ordinary temperature.—Ph. Centralh., February 13th, 1879, p. 63.

Nitrate of Ammonium—Application to Reduction as well as Elevation of Temperature.—Professor R. Böttger draws attention to the following interesting lecture experiment: If nitrate of ammonium is dissolved in its own weight of water, the temperature becomes reduced suddenly some 25° to 30° C. ($= 45^\circ$ to 45° F.); consequently, with ordinary cold water, several degrees below zero C. (32° F.). If, as soon as this degree of cold is reached, a quantity of powdered zinc equal to the quantity of the salt used is added, the mixture, according to Dr. Jacobsen, will begin to boil violently in a few moments, and if the experiment is made

in a glass vessel, the enormous change in temperature will have for its inevitable effect the breakage of the vessel. For this reason, the experiment is best made in a metallic vessel.—Ph. Centralh., November 7th, 1878, p. 430.

Sulphate of Ammonium—Industrial Production from Fæces.—The works at Grätz produce yearly 10,000 metric cwts. of sulphate of ammonia from fæces, and are very remunerative. The ammonia is obtained by mixing the fæces with 2 to 3 per cent. of lime in the form of milk, and distilling. The ammoniacal gas and steam saturated with gas are drawn into leaden neutralizing receivers. The sulphuric acid employed is of the strength of 60° (probably Baumé), and the salt obtained is almost white. The town of Grätz, with a population of 100,000, yields daily 3000 pails of semifluid fecal matter, about one-third of which is consumed in the above-mentioned works.—Chemiker Zeit., No. 41, 1878 ; in Chem. News, November 29th, 1878, p. 265.

Amidosulphonic Acid.—E. Berglund has studied the characters of this acid and its compounds. It may be obtained by decomposing the basic barium salt or the barium and mercury salt of amidosulphonic acid with dilute sulphuric acid, but is best obtained in a pure state from the silver salt of amidosulphonic acid by decomposition with sulphuretted hydrogen and evaporation of the solution over sulphuric acid. Amidosulphonic acid ($\text{NH}_2\text{SO}_3\text{H}$) forms large transparent crystals, which are anhydrous and permanent in the air, and may be heated to 190° C. (= 374° F.) without undergoing decomposition. It dissolves easily in water, and with difficulty in alcohol. The aqueous solution may be heated to the boiling-point without alteration, but the acid is converted into acid sulphate of ammonium by prolonged boiling. This reaction takes place more rapidly in presence of hydrochloric acid, and is determined at once by the addition of chlorate of potassium or nitrous acid, even in the cold. The aqueous solution dissolves iron and zinc, evolving hydrogen, and forming the corresponding amidosulphonates. It gives no precipitate with hydrate of barium, but when heated with hydrochloric acid and chloride of barium it gradually deposits sulphate of barium, whilst with chlorate of potassium and hydrochloric acid in presence of chloride of barium it gives at once a precipitate of sulphate of barium on being heated. These reactions are characteristic of the acid. The salts of amidosulphonic acid are all soluble in water, but insoluble in alcohol, and generally crystallize

well. Their solutions may be heated to ebullition without alteration. The salts containing water of crystallization undergo decomposition at 100°C . ($= 212^{\circ}\text{F}$.) yielding sulphates; the anhydrous salts are stable at higher temperatures. The salts of the alkalies give off ammonia at 160° to 170°C . ($= 320^{\circ}$ to 338°F .), being converted into salts of imidosulphonic acid. The following salts have been analyzed:

Amidosulphonate of Potassium— $\text{NH}_4\text{SO}_3\text{K}$.—Obtained by double decomposition of the barium salt and sulphate of potassium. Rhombic tables.

Amidosulphonate of Sodium— $\text{NH}_4\text{SO}_3\text{N}$.—Very soluble needles.

Amidosulphonate of Lithium— $\text{NH}_4\text{SO}_3\text{Li}$.—Long, deliquescent needles.

Amidosulphonate of Ammonium— $\text{NH}_4\text{SO}_3\text{NH}_4$.—Large, deliquescent tables, melting without decomposition at 125°C . ($= 257^{\circ}\text{F}$.).

Amidosulphonate of Thallium— $\text{NH}_4\text{SO}_3\text{Tl}$.—Long, brilliant prisms.

Amidosulphonate of Silver— $\text{NH}_4\text{SO}_3\text{Ag}$.—Long, hard prisms, dissolving in 15 parts of water at 19°C . ($= 66.2^{\circ}\text{F}$.), and blackening in the light.

Amidosulphonate of Barium— $(\text{NH}_4\text{SO}_3)_2\text{Ba}$.—Fine, long prisms, soluble in three parts of water at the ordinary temperature.

Amidosulphonate of Strontium— $(\text{NH}_4\text{SO}_3)_2\text{Sr} + 4\text{H}_2\text{O}$.—Large, well-formed prisms, more soluble than the barium salt.

Amidosulphonate of Calcium— $(\text{NH}_4\text{SO}_3)_2\text{Ca} + 4\text{H}_2\text{O}$.—Thin laminæ, very soluble.

Amidosulphonate of Lead— $(\text{NH}_4\text{SO}_3)_2\text{Pb} + \text{H}_2\text{O}$.—The most soluble of the amidosulphonates. Small needles, not deliquescent.

Amidosulphonate of Nickel— $(\text{NH}_4\text{SO}_3)_2\text{Ni} + 3\text{H}_2\text{O}$.—Clusters of emerald-green needles, very soluble.

Amidosulphonate of Cobalt— $(\text{NH}_4\text{SO}_3)_2\text{Co} + 3\text{H}_2\text{O}$.—Stellate groups of red needles.

Amidosulphonate of Manganese— $(\text{NH}_4\text{SO}_3)_2\text{Mn} + 3\text{H}_2\text{O}$.—Crystalline, rose-red mass, very soluble.

Amidosulphonate of Zinc— $(\text{NH}_4\text{SO}_3)_2\text{Zn} + 4\text{H}_2\text{O}$.—Radiated crystalline mass.

Amidosulphonate of Cadmium— $(\text{NH}_4\text{SO}_3)_2\text{Cd} + 5\text{H}_2\text{O}$.—Very soluble microscopic tables.

Amidosulphonate of Copper — $(\text{NH}_4\text{SO}_3)_2\text{Cu} + 2\text{H}_2\text{O}$. — Blue needles and long tables, less soluble than the preceding salts.

The *magnesium, aluminium, and uranium* salts are very soluble. The *ferric* salt is resolved on evaporation into basic salt and free acid.—Bull. Soc. Chim. (2), 29, pp. 422–426; in J. Chem. Soc., August, 1878, p. 643.

CÆSIUM AND RUBIDIUM.

Cæsium and Rubidium—Equivalent Weights.—Dr. Richard Godefroy has undertaken to determine the equivalents of cæsium and rubidium from their chlorides. He finds that for *cæsium* to be 132.557 (in round numbers 132.6; Bunsen gives 132.99, or 133); for *rubidium*, 85.476 (in round numbers, 85.5; Bunsen found 85.36; Picard, 85.41).—Ph. Centralh., January 2d, 1879, p. 2.

LITHIUM.

Lithia—Presence in Rocks and Sea-water.—Mr. L. Dieulafait finds that lithia is as widely distributed as soda and potassa, and that it accompanies these two bases in all primordial rocks. In sea-water it may be detected in the residue from the evaporation of a single cubic centimeter.—Compt. Rend., March 24th, 1879; in Chem. News, April 25th, 1879, p. 184.

CALCIUM.

Alkaline Earths—Lime, Strontia, and Baryta in the Crystalline State.—By heating the nitrates of barium, strontium, and calcium in covered porcelain crucibles, placed in a coke fire, G. Brügelmann has succeeded in obtaining crystals of the oxides so much larger than those described in a former paper that several other crystallographic and physical properties of the three oxides have been made out. The present paper describes in detail the configuration and grouping of the crystals in each case. The sp. gr. of the crystals were found to be: $\text{CaO} = 3.251$; $\text{SrO} = 4.750$; $\text{BaO} = 5.722$; and the specific volumes, calculated from these results, are: $\text{CaO} = 17.225$; $\text{SrO} = 21.789$; $\text{BaO} = 26.739$. It may be noted that the sp. gr. and specific volume of strontia have very nearly the value of the means between those of lime and baryta.—Ann. Phys. Chem (2), IV, 277–283; in J. Ch. Soc., October, 1878, p. 770.

Lime—Use as Substitute for Explosive Agents.—Unslacked lime, pressed in the form of cartridges, has recently been used with some success in lieu of blasting-powder, particularly in coal mines. The cartridges are inserted into the borings, and water being poured in causes powerful expansion, which answers all the purposes of the blast without breaking up the coal too much, as is the case with blasting-powder. Besides, if the method should prove practicable, it is economical, avoids the danger of fire, and does not vitiate the air in the mines.—Ph. Centralh., May 1st, 1879. p. 183.

Lime-water—Relation of its Strength to the Aqua Phagedænica of the Various Pharmacopœias.—L. C. W. Cocx draws attention to the conditions that affect the strength of lime-water, with particular reference to its application to the preparation of aqua phagedænica. The experiments of Lamy* have shown how variable lime-water may be under certain circumstances, the quality of the lime, the molecular aggregation, and the temperature at which the solution is made being important factors. The least soluble lime is that obtained from the carbonates direct, while that made by heating the hydrate or nitrate to redness is the most soluble. Several successive solutions from the same lime exposed to a temperature of 43°–45° C. (= 109.4°–113° F.) decrease the solubility, and even filtration has a tendency to weaken lime-water, owing to the absorption of lime by the paper. The subjoined table, given by Lamy, very tersely illustrates the effect of temperature, as well as of the quality of the lime, upon the solution. The table shows the quantity of lime held in solution in 1000 p. of lime-water prepared from (A) lime obtained by heating carbonate precipitated from nitrate to redness; (B) lime from marble; (C) ordinary lime heated to redness, before making the solution, at the temperatures indicated:

Temperature.	Lime A.	Lime B.	Lime C.
0° C. = 32° F.	1.362	1.381	1.430
10° C. = 50° F.	1.311	1.342	1.384
15° C. = 59° F.	1.244	1.299	1.348
30° C. = 86° F.	1.142	1.162	1.195
45° C. = 113° F.	0.996	1.005	1.033
60° C. = 140° F.	0.884	0.868	0.885
100° C. = 212° F.	0.562	0.576	0.584

* Communicated to Compt. Rend., No. 5, 1878.

It will be observed from the above that there may be wide limits between the quantities of lime contained in water at various temperatures. The directions of the pharmacopœias as to the strength of their solutions vary, as far as they are given, quite immaterially; the Phar. Helv. requires $\frac{1}{80}$; the Phar. Britan., 1.28; and the Codex, 1.285 grams pro liter, or about $\frac{1}{778}$ part. These quantities correspond nearest with the quantities of lime contained in the solutions from A and B, obtained at 15° C. (= 59° F.), and such will probably be the strength of properly prepared lime-water.

Reviewing now the relation of lime-water to corrosive sublimate, in the various officinal formulas, it is found that only those of the German and French Pharm. correspond, both requiring 300 p. of lime-water to 1 p. corrosive sublimate; the British Pharm. requires 240, the Belgian, 250, the Russian, 340, while the Netherlands Pharm. requires but 144 p. to 1 p. of the corrosive sublimate. In all of these, except in the last named, the relation of lime to corrosive sublimate is sufficient to effect complete decomposition of the latter; the quantity of the Pharm. of the Netherlands is insufficient, a portion of corrosive sublimate remaining undecomposed. The quantity of properly-prepared lime-water necessary to the complete decomposition of 1 part of corrosive sublimate is 160–165 parts. Some of the older pharmacopœias prescribed a smaller proportion of lime-water than do the present officinal formulas above named; those of Denmark, Amsterdam, and Antwerp requiring 192, while that of Parma required 288. The author, speaking of the Netherlands Pharm., advocates the adoption of the proportion of 1:250.—Arch. f. Ph., February, 1879, pp. 145–149.

Carbonate of Calcium—Precipitation.—E. Drechsel finds that the precipitation of calcic carbonate is complete in the cold in the course of fifteen minutes if aided by stirring. It may be effected indifferently either by sodic or ammonic carbonates in the presence or absence of ammonia or sal ammoniac. The calcic solution should be introduced into the alkaline carbonate, pouring in a small quantity only at first, and stirring for about five minutes before adding more. The solubility of calcic carbonate in alkaline liquids is very trifling.—J. f. Prakt. Ch.; in Chem. News, June 13th, 1879, p. 264.

Chloride of Calcium—Decomposition by Water.—H. C. Dibbitts finds that crystalline chloride of calcium ($\text{CaCl}_2 + 6\text{H}_2\text{O}$) loses

in dry air, even below 10°C. ($= 50^{\circ}\text{F.}$), five molecules of water, the first four of which escape readily and the last much more slowly. At 80°C. ($= 176^{\circ}\text{F.}$) the salt becomes completely anhydrous in dry air. When the salt loses all its crystalline water at a temperature not exceeding 130°C. ($= 266^{\circ}\text{F.}$), no appreciable loss of hydrochloric acid takes place. Between 130° and 140°C. ($= 266^{\circ}$ and 284°F.) the escape of acid becomes perceptible. The more the temperature rises the more hydrochloric acid escapes; still, even if gently heated over a naked flame, the decomposition is so slight that not more than 0.03 per cent. of acid is lost. Even at 150°C. ($= 302^{\circ}\text{F.}$) the loss is so slight that it remains entirely within the ordinary limits of error.—Arch. Neerland. des Sc., 1879; in Chem. News, April 25th, 1879, p. 184.

Chloride of Calcium—Waste Product in Solvay's Ammonia-Soda Process.—The manufacture of soda by the ammonia process has, during the last few years, been much developed, owing to the advances made by Mr. E. Solvay, and is likely to become more generally employed, and, indeed, may ultimately supersede Leblanc's method. Mr. O. Gluge draws attention to the chloride of calcium which is formed in considerable quantities by this process, and which is commonly thrown away as useless, as it has hardly been employed hitherto in manufacturing processes. The reaction which occurs in this manufacture, as is now generally known, takes place between bicarbonate of ammonium and chloride of sodium. Bicarbonate of sodium is precipitated and chloride of ammonium remains in solution. The bicarbonate is separated by filtration, and the solution is employed to furnish fresh bicarbonate of ammonium—the ammonia being liberated from it by distillation with lime, whereby a strong solution of chloride of calcium remains in the still. It would be desirable that men of science, and manufacturers, should endeavor to ascertain if a more extended use could be made of a product which can be got at such a cheap rate.—Ch. News, March 7th, 1879, p. 97.

MAGNESIUM.

Magnesia—"Iodated Alkali" as Reagent.—In Jour. de Ph. et de Ch., 1878, Schlagdenhauffen states that a reagent prepared by dissolving iodine in a 2 per cent. solution of caustic potassa until the liquid retains a golden-yellow color, will precipitate magnesia from its solution, while the other alkaline earths, or earths proper,

are not affected by it. It is now stated in Ph. Centralhalle (February 27th, 1879, p. 91), that while the reagent produces turbidity in neutral solutions of magnesium salts, no precipitation occurs in acid solutions or in such that contain ammonium salts. Moreover, it is found that neutral solutions of calcium, aluminium, and barium salts, are also rendered turbid by the reagent; hence it cannot be employed as a special reagent for magnesia.

Carbonate of Magnesium—Analysis of Commercial Samples.—Mr. R. H. Wallace has examined three samples of commercial carbonate of magnesium with the following results :

Carbonate of magnesia.	No. 1. Pattison's.	No. 2. Jenning's.	No. 3. German.
Magnesium, as oxide.....	40.31 per cent.	38.56 per cent.	42.12
Carbonic anhydride.....	83.25 "	82.18 "	34.05
Water of hydration.....	22.67 "	22.30 "	21.58
Calcium, as oxide.....	1.61 "	2.15 "	1.25
Sodium, as oxide		2.50 "	
Iron, as ferric oxide.....	0.21 "	0.34 "	traces.
Sulphates.....	traces.	traces.	
Chlorides.....		traces.	
Silica.....		traces.	traces.
Total.....	98.05 per cent.	98.03 per cent.	99.00

Deducting the carbonic anhydride of the calcium and sodium carbonates, No. 1 contained 94.98 per cent. of magnesium carbonate ; No. 2, 89.58 per cent. ; No. 3, 96.77 per cent.

The author also examined two samples of *heavy calcined magnesia*, with the following results :

Calcined magnesia.	No. 1. Husband's.	No. 2. Powers & Weightman's.
Magnesium, as oxide.....	89.67 per cent.	96.21 per cent.
Water of hydration.....	5.85 "	
Calcium, as oxide.....	1.89 "	1.19 "
Sodium, as oxide.....	1.23 "	.80 "
Iron, as ferric oxide .....	.27 "	.12 "
Silica.....	trace.	trace.
Chlorides and carbonates.....	trace.	
	98.91 per cent.	98.32 per cent.

A. J. Ph., December, 1878, p. 567.

Epsom Salt—Medicinal Value of Dilute Solutions containing Chloride of Sodium.—Professor F. H. Storer draws attention to

the value of dilute solutions of sulphate of magnesium for the prevention of constipation during the heated term. He attributes the latter to the excessive waste of water from the body by perspiration, and is of the opinion that the salt tends to detain the water in which it is held dissolved, which is consequently carried into the rectum instead of being discharged through the skin. He had found the Friedrichshall bitter-water—which contains mainly magnesian salts—to be an efficient preventive, not only against the constipating effect of profuse perspiration, but also against that induced by ripe strawberries, or, as is frequently the case, by both together. A solution of 15 grams of Epsom salt and 8 grams of common salt in a champagne bottle (quart) full of water, is not only equally effective against the kinds of constipation mentioned, but is of far less disagreeable taste. A small wine-glassful of this solution may be taken three or more times a day. How far the common salt may contribute to the efficacy of the solution, the author is not prepared to say; but it possesses at least the merit of abating, or disguising to an appreciable extent, the disagreeable taste of the Epsom salt. He had noticed, also, in several instances, that the taste of the mixed solution has improved on standing; that is to say, a slight but peculiar disagreeable taste was noticeable in the freshly prepared solutions that could not be detected in solutions that had been kept a week or more.—A. J. Ph., July, 1878, p. 321.

ALUMINIUM.

Aluminium.—According to Clemens Winkler aluminium is produced almost exclusively in France, and notwithstanding its relatively high price (130–200 francs per kilogram) it is in regular demand. Its chief application is for the purpose of producing aluminium-bronze, which, owing to its handsome golden color, is used extensively in the manufacture of ornaments. Notwithstanding that the metal, owing to its lightness, is particularly suitable for scale beams, it appears to find little application in this direction.—Arch. f. Ph., February, 1879, p. 177; from Ding. Jour., 230, p. 159.

Alumina—Compound with Carbonic Acid.—Messrs. Urbain and Renoul find that if alumina is precipitated from alum by means of carbonate of sodium, two bodies are obtained differing in aspect according as the liquid was boiling or at the common tem-

perature of the atmosphere. In the former case the precipitate is gelatinous, transparent, and filters slowly, whilst in the latter case it is opaque, separates readily from the liquid, and absorbs coloring matters more abundantly than the transparent variety. The authors find that the opaque variety contains carbonic acid in such proportions that it may be represented by the formula, $\text{CO}_2, 2\text{Al}_2\text{O}_3, 8\text{H}_2\text{O}$.

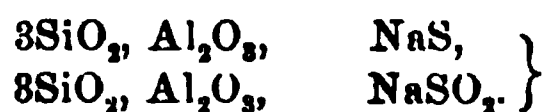
Professor J. Lawrence Smith observes in this connection that a natural carbonate of alumina and soda exists near Montreal.— Compt. Rend., June 2d, 1879; in Ch. News, June 20th, 1879, p. 277.

Potash Alum—For a long time, and until within the last few years, in consequence of the relatively high price of potash salts, ammonia almost universally displaced potash in alum making. But owing to the increased demand on the part of agriculturists for sulphate of ammonium, and the comparative failure of the ammonia in the guano supplies, the price of ammonia salts has now risen to such a degree as to place them beyond the reach of the alum manufacturers, whilst the discovery of the Stassfurth deposits has opportunely very materially lowered the price of potash salts. Consequently most of the pure alum now used in manufactures contains potash instead of ammonia. Mr. Peter Spence, of Pendleton, England, in 1845, devised a process which has since been continuously improved by him, and is now, almost without exception, the only method employed in the manufacture of potash alum. In its preparation three materials are employed. 1. Alumina, as an impure silicate known as fire-clay, and found underlying the coal seams; 2. Sulphuric acid; 3. Potash, in form of chloride or sulphate. The first operation is to calcine the fire-clay in large heaps, by which the alumina is rendered soluble and the clay becomes more easily acted on by the acid. The calcined material is put into large pans lined with lead, capable of holding 20 tons, where acid diluted with mother-liquor from previous operations is added, and the whole is boiled with steam until most of the alumina is converted into sulphate of alumina, and dissolved. It is now run into coolers, and sufficient potash is added to form alum. By agitating and cooling, the alum (being only slightly soluble in the cooled liquor) gradually falls to the bottom in the form of small crystals, from which the mother liquor is drained in tanks with false bottoms. Repeated washings with pure liquor then follow, and finally the crystals are removed

from the tanks, dissolved by steam, and the hot, strong solution run into large wooden tubs, where, by slow cooling, massive, hard and clear crystals, almost completely free from iron, are obtained. The perfect standard of purity for alum is freedom from iron, and this appears to be practically reached by Mr. Spence, whose exhibit at the Paris Exhibition attracted universal attention.

Sulphate of Alumina is now used to a considerable extent for the same purpose as alum, certain disadvantages, such as irregularity of composition, excess of acid and consequent deliquescence, and the presence of a considerable quantity of iron, which formerly more than counterbalanced the advantage of a large proportion of alumina, having been, to some extent, overcome.—“The Paris Exposition;” in Ph. J. Trans., November 2d, 1878, p. 343–4.

Ultramarine.—This product is so associated in the popular mind with the beautiful blue color of the pigment formerly prepared from lapis lazuli, that the great variety of shades embraced in the exhibits of this article at the recent Paris Exhibition was doubtless a surprise to many, and not every chemist, even, was prepared to see—as in the case of M. Guimet—a series of specimens passing from brown through green, blue, violet, and red to white. Very great attention is paid to the manufacture in France and Germany, and it is estimated that of the 10,000 tons said to be produced annually in Europe, one-fourth is made in France. According to Plicque, the great advance made during recent years in the delicacy of shade and in coloring power, has not been marked by a corresponding increase in the capability of resisting the action of alum and aluminum sulphates, and this still remains a weak point in artificial ultramarine. *Green ultramarine* has long been known as an intermediate product, nevertheless, the industrial manufacture of green and violet ultramarines is quite recent, but the products are said to be coming into favor. Plicque considers the ultramarines to be double silicates of alumina and soda, in which oxygen is partially replaced by sulphur, and he represents the pure blue ultramarine as follows:



Upon substituting oxygen for sulphur in the primitive molecule,

the color passes from green to blue, and from blue to violet, treatment by acids indicating that the violet ultramarine contains more oxygen than the blue, whilst green contains more sulphur. Upon treating the ordinary blue ultramarine with nitrate of silver, sodium is displaced by silver, giving rise to a yellow product, and upon heating this yellow silver ultramarine with a metallic chloride, chloride of silver is formed, together with a fresh ultramarine of potassium, barium, zinc, or magnesium, as the case may be. The subject, however, is not yet fully investigated, and it is believed that the delicacy of shade obtained by different makers is due to physical causes, and, as a rule, is at present dependent rather upon empirical skill in manipulation, than upon an exact knowledge of the principles to be followed in successful manufacture.—“The Paris Exhibition;” in Ph. J. Trans., November 2d, 1878, p. 344.

Dr. E. Büchner gives in full a paper by Gmelin, extracted from the *Naturwissenschaftliche Abhandlungen* for the year 1828, in which document Gmelin states that he had turned his attention to the artificial preparation of ultramarine as early as 1826, and in the spring of 1827, whilst on a visit in Paris, had communicated his ideas to Gay-Lussac, and to his friend Robinet, who both recommended him to keep the matter secret. He was, therefore, much surprised on learning that on February 4th, 1828, Gay-Lussac announced to the Academy of Sciences that the synthesis of ultramarine had been effected by Guimet. Dr. Büchner accuses Guimet of having appropriated the discovery of another, and hints that he may have had accomplices.—Chem. Zeit., No. 44, 1878; in Ch. News, December 6th, 1878, p. 274.

CERIUM AND ALLIED METALS.

Didymium—Probably a mixture as obtained from Cerite.—Since the interesting researches of Mosander, the results of which have been confirmed by Marignac, Bunsen, Clève, etc., didymium has been accepted as a simple body. All these chemists have worked upon the cerite of Bastnoes, and none of them seemed to have made a comparative study of the didymium derived from other minerals. M. Delafontaine's former experiments on didymium from gadolinite led him to suspect that didymium is not a simple body, and these suspicions have been strengthened by certain recent observations on samarskite from the United States. The

solutions of didymic salts yield a fine absorption spectrum, characterized by numerous bands and rays, the positions of which have been determined by MM. Bunsen and Lecoq de Boisbaudran. But the author finds that solutions of didymic nitrate from samarskite yield a spectrum less complete than that from cerite. In the least refrangible portions of the blue ceritic didymium displays a group of four narrow bands nearly equidistant. In the didymium from samarskite the author has not been able to detect this group, and he concludes, consequently, that ceritic didymium contains a new element, characterized by the bands above mentioned.—Compt. Rend., October 28th, 1878; in Ch. News, November 22d, 1878, p. 253.

Mosandrium—A New Metal (?).—According to the "Correspondance Scientifique" of July 30th, 1878, Dr. J. Lawrence Smith has discovered a new metal belonging to the cerium group, and has named it "mosandrium," after Mosander, whose researches on this class of metals are well known. The new earth, "mosandria," from which the metal was obtained, differs from the rest of the group of which yttria is the head by its reaction with sulphate of potassium, although what this reaction is is not stated. From oxide of cerium mosandria differs by its solubility in weak nitric acid and in alkaline solutions supersaturated with chlorine; from lanthanum by the color of its oxide and salts, and from didymium by certain dark rays in the bright part of the spectrum.—Chem. News, August 2d, 1878, p. 61.

C. Marignac does not yet see any sufficient reason for distinguishing the earth described by Professor Smith from terbia. All its positive characters seem to point to that earth, while the negative characters are not sufficiently definite to conclude therefrom the existence of a new metal.—Ibid., August 30th, 1878, p. 112.

Mr. Marc Delafontaine also contends that the experiments of Mr. Marignac, and his own, leave no doubt on the identity of terbia and of the so-called mosandric oxide of Professor Smith, and he sees nothing in the note of that author to justify his priority as regards the discovery of a new metal—the new metal being that discovered by Mr. Delafontaine, called by him "philippium" (which see), and entirely distinct from mosandrium.—Compt. Rend., October 22d, 1878; in Chem. News, November 8th, 1878, p. 231.

Philippium—A New Metal.—Mr. Marc Delafontaine's researches

on the samarskite earths, in which he has been engaged for more than two years, have led to the discovery in that mineral of a fourth earth belonging to the yttria group. As this new earth occupies an intermediate position as to color and weight between yttria and terbia, it might naturally be supposed that it is after all only a mixture of these two bodies. But the numerous and varied experiments that the author has made convince him that such is not the case. Further, profiting by the examination which M. Soret has just made of the absorption spectrum of erbium, and also by his recent study of the spectra of other earthy metals, Mr. Delafontaine has been enabled to confirm the correctness of his former conclusions. He therefore definitely announces the discovery of the oxide of a new metal, to which he has given the name of Philippium (Pp) in honor of his benefactor, Mr. Philippe Plantamour, of Geneva, the friend and pupil of Berzelius. The following are the distinctive characters of the new earth: Admitting provisionally that philippia is a protoxide, its approximate equivalent is comprised between 90 and 95. Philippic formiate crystallizes with great facility, either on cooling or by spontaneous evaporation, in small brilliant rhomboidal prisms, less soluble than the formiate of yttria, which is deposited in mammillary form from a syrupy solution. The terbic formiate is anhydrous, and soluble in from 30 to 35 parts of water. The sodio-terbic sulphate dissolves with difficulty in a saturated solution of sodic sulphate, whilst the corresponding (philippic?) salt dissolves in it easily. The philippic oxalate is more soluble in nitric acid than the terbic salt, but less so than the yttria salt. The philippic nitrate becomes a deep-yellow color when it is dissolved; those of yttria and terbic remain colorless. The salts of philippium are colorless. The earth becomes white in a current of hydrogen, and also on being calcined, but it becomes yellow again on exposure to the air during cooling. This color does not appear to be due to any mixture with terbia. The spectrum of philippium is markedly distinct from the spectra of terbium, yttrium, and erbium, and is quite characteristic.—Ch. News, October 25th, 1878, p. 202; from Compt. Rend.

Decipium—A New Metal.—Mr. Delafontaine announces the discovery of another new metal in the samarskite earths of North Carolina, which he has named “decipium” (from *decipiens*). This metal, which possesses the properties common to those of

cerite and gadolinite, forms an oxide, the equivalent of which is approximately 122, its formula DpO (or $Dp_2O_3 = 366$). The author has not yet effected the separation of this new metal from didymia completely enough to affirm that its color is white. Its salts are colorless; the acetate crystallizes very easily, and seems to be less soluble than that of didymium, but more so than that of terbium. The decipio-potassic sulphate is only slightly soluble in a saturated solution of potassic sulphate, but dissolves easily in water. The nitrate of decipium gives an absorption spectrum composed of three bands at least, in the indigo and blue. The spectrum, however, appears to require further study and definition. In the present state of the author's knowledge he recognizes in the samarskite earths of North Carolina (more or less combined with other earths) the following:

Name.	Color.	Equivalent.	Characteristic Absorption-band.
Yttria,	White,	$YO = 74.5$ (Delafontaine),	None.
Erbia,	Rose,	$ErO = 130$ (Bunsen, Clève),	520-522.
Terbia,	Orange,	$TbO = 114-115$ (Delafont., Marignac),	About 400.
Philippia,	Yellow,	$PpO = \text{about } 90$ (Delafontaine),	" 449.
Decipia,	White?	$DpO = \text{about } 122$ (Delafontaine),	416.
Thoria,	White,	$ThO = 267.5$ (Delafontaine),	None.
Oxide of Didymium,	Brownish,	$DiO = 112-114$ (Marignac, Clève),	572 to 477.
Oxide of Cerium,	Pale yellow,		None.

The equivalents* of these metals contained in some of these earths show rather interesting numerical relations to each other:

Yttrium,	58.
Philippium,	$74 \text{ or } 58 + 2 \times 8.$
Terbium,	$98 \text{ or } 58 + 5 \times 8.$
Decipium,	$106? \text{ or } 58 + 6 \times 8.$
Erbium,	$114 \text{ or } 58 + 7 \times 8.$

If the above metals are considered as triatomic the difference will be 12, or one of its multiples, instead of 8.—Chem. News, November 3th, 1878, p. 223; from Compt. Rend.

Ytterbia—A New Earth.—At the close of his researches on the gadolinite earths, which he had undertaken for the purpose of confirming Delafontaine's observations of the existence of terbia and of the new base, philippia (which see), Mr. C. Marignac

* This term is employed by the author until the true atomic weights have been accurately determined.

obtained a few grains of an earth, which he at first considered to be erbia, but which subsequently proved to be a mixture of two bases, one of which should retain the name erbia, while the other is a new earth, for which he proposes the name *ytterbia*, not only by way of alluding to its presence in the mineral of Ytterby, but on account of its resemblance to yttria by its whiteness on the one hand, and to erbia by the elevation of its equivalent on the other, as well as by the resemblance to the latter earth in most of its properties. The small quantity of material has not admitted of a complete study of the properties of the new earth, although the following few indications establish its individuality:

Ytterbia is perfectly white; its salts are colorless, and the nitrate is decomposed by the aid of heat without being colored. Its solutions give no absorption rays, neither in the ordinary spectrum nor in the ultra-violet, according to the observations which Mr. L. Soret has made. Ytterbia is less easily acted upon by acids than the other earths of this group. It dissolves slowly in dilute acid, either cold or moderately heated, but always easily in boiling dilute acids, even in acetic and formic acids. Its sulphates exactly resemble those of yttria and erbia, with which it is probably isomorphous, and it is easily redissolved without deposit in a saturated solution of potassic sulphate. No precipitate is formed, even when the solution is boiled. A neutral solution of ytterbic chloride, if it is not too concentrated, is not precipitated by boiling with sodic hyposulphite. If the solution is very concentrated, and contains both erbium and ytterbium, a precipitate is obtained which is richer in erbium than the earths remaining in solution. It is precipitated from its salts by potash, and submitted to a current of chlorine in presence of excess of potash is completely redissolved. The formiate dissolves in less than its weight of water. It crystallizes in the mammillary form like the formiates of yttria and erbia. Like them it is decomposed and tumefied by heat. It presents the same composition corresponding to the formula $\text{Yb}_2\text{O}_3, 3\text{C}_2\text{H}_3\text{O}_2 + 4\text{H}_2\text{O}$. It also loses its water of crystallization at 100°C . ($= 212^\circ \text{F}$). Adopting, provisionally, for ytterbia the equivalent 131, the author deduces for the atomic weight of ytterbium the value 115, or 172.5, according as the formula YbO or Yb_2O_3 is attributed to the oxide.

The above characters sufficiently establish the fact that this earth contains no thoria, the only earth amongst those known, or which may be supposed to exist, whose equivalent would be suf-

ficiently elevated for its presence to account for the increase in that of erbia.—Ch. News, November 1st, 1878, p. 213; from Compt. Rend.

L. F. Nilson has succeeded in preparing perfectly pure ytterbia, presenting no trace of an absorption ray, and having a molecular weight between 131.92 and 132.17. The erbia of all preceding authors, including Marignac, consists chiefly of ytterbia, to which very small quantities of erbia give a rose color. Ytterbia is probably Yb_2O_3 .—Compt. Rend., March 24th, 1879; in Ch. News, April 25th, 1879, p. 184.

Scandium—A New Element.—L. F. Nilson has extracted from impure erbia a substance whose spectroscopic behavior indicates its novelty, and which he names as above. Its atomic weight, calculated for the formula of the earth, ScO , is below 90.—Compt. Rend., March 24th, 1879; in Ch. News, April 25th, 1879, p. 184.

Samarskite—New Spectral Rays observed in Substances extracted from It.—On examining with the spectroscope, both by absorption and by means of the electric spark, the products of his operations on the mixture of earths from samarskite, Mr. Lecoq de Boisbaudran has observed rays or bands not to be referred to any element formerly known, and not corresponding to the descriptions of the spectra of the earths recently announced by MM. Delafontaine, Smith, Soret, and De Marignac. These new rays of absorption and emission seem to belong to one and the same body. The emission spectrum is composed of four bands, shaded towards the left and formed of narrow rays, the strongest of which is the most refrangible and forms the right margin of the band. The absorption spectrum comprises two strong bands in the blue, and several rays of less importance in the green. The metal which yields these new spectra is precipitated as a double potassic sulphate along with didymium; its simple sulphate is rather less soluble than that of didymium; its oxalate is precipitated along with didymium, but ammonia separates the oxide of the new metal before that of didymium. Regarding the difference of the

Didymium of samarskite and of cerite, observed by Mr. Delafontaine, the author concludes that both give alike the blue rays, 482.2, 475.8, and 469.1.—Compt. Rend., February 17th, 1879; in Ch. News, March 14th, 1879, p. 115.

Salts of certain Earthy Metals—Fluorescence.—J. L. Soret has already pointed out the beautiful violet fluorescence of solution of the sulphate and the chloride of cerium elicited only by the extreme ultra-violet rays of the induction spark, the solar rays not being sufficiently refrangible for its production. He has since found that the solution of many salts of the earthy metals possess analogous properties. He enumerates chloride and sulphate of didymium; the chlorides of lanthanum, terbium, yttrium, erbium, ytterbium, and philippium; sulphate of thorium; sulphate and chloride of zirconium; and the chlorides of aluminium and glucinium.—Compt. Rend., May 26th, 1879; in Ch. News, June 13th, 1879, p. 262.

MANGANUM.

Manganic Tetrachloride.—W. W. Fischer has examined the chlorides that are produced when peroxide and sesquioxide of manganese are treated with hydrochloric acid at the ordinary temperature. He found that when higher oxides than the manganous oxide are treated with strong acid in excess brown liquids are obtained, which contain a highly chlorinated compound of manganese, probably MnCl_4 . This compound is easily resolved into manganous chloride and free chlorine, and on dilution with water manganic hydroxide is precipitated out. If a large excess of HCl is employed, the compound MnCl_4 appears to become more stable; it probably, exists only in a condition similar to the platinum-hydric chloride.—Ph. Centralh., January 16th, 1879, p. 17.

Permanganate of Potassium—Decomposition.—Morawski and Stingle detail experiments made with a view to determine the reactions occurring during oxidation processes with permanganate of potassium. They concluded that before explaining these the formula of permanganate of potassium must be doubled ($\text{K}_4\text{Mn}_2\text{O}_{10}$), and give the following résumé of their labors:

1. Permanganate of potassium readily gives off 6 atoms of oxygen when it is heated to redness, or when in *neutral* solution it is brought in contact with easily oxidizable bodies. Sulphocyanide of potassium, ethyl alcohol, oxalic acid, and glycerin are completely oxidized under these conditions; acetic acid is not.

2. The precipitate which is produced under these circumstances is an oxygenated compound of potassium, hydrogen, and manganese, having the constant composition, $\text{Mn}_4\text{KH}_3\text{O}_{10}$, while the

residue of heating to redness is a compound perfectly analogous to it, $\text{Mn}_4\text{K}_4\text{O}_{10}$.

3. This compound is produced also in other ways; for instance, when $\text{Mn}_2\text{H}_4\text{O}_8$, which is produced by the action of MnCl_2 upon permanganate is digested with caustic potassa, or when the residue obtained by heating permanganate to redness is treated with water.—Ph. Centralh., December 19th, 1878, p. 482.

Manganese—Volumetric Determination.—The same authors have devised a method for the volumetric determination of manganese, which is based upon the above-named reaction between permanganate of potassium and manganous chloride: 1 mol. of the first oxidizing 6 mol. of the manganous chloride to manganic superoxide, which separates in the hydrated state. Permanganate solution, of known strength, is dropped into the solution of manganous chloride, contained in a porcelain capsule, until a faint rose-red color appears on the edges of the liquid, and remains permanent.—Ph. Centralh., January 9th, 1879, p. 12.

Manganese—Production of Ferromanganese.—P. Jordan states that by treating manganese ores in blast-furnaces at St. Louis, near Marseilles, ferromanganese has been obtained containing as much as 87.4 per cent. manganese, but when this amount is exceeded the alloy tarnishes on exposure to air. An analysis of a sample is given which contained: Mn, 84.96; Fe, 8.55; C, 5.70; Si, 0.66; S, 0.035; and P, 0.005.

Volatility of Manganese.—Observations made at the above manufactory in the production of ferromanganese have made it evident that manganese is volatile at the temperature of the furnaces. This conclusion has been further borne out by heating ferromanganese contained in a graphite crucible in a furnace. The ferromanganese so treated was found by Mr. Jordan to contain a smaller percentage of manganese, and the crucible was penetrated by oxide of manganese.—Compt. Rend., 86, pp. 1374–1377; in J. Chem. Soc., October, 1878, p. 772.

FERRUM.

Iron Ore—Application of Powdered Zinc to its Analysis.—Mr. F. M. Brown mixes the iron ore to be examined (0.03 gram) with ten times its weight of moderately fine powdered zinc, places the mixture into a porcelain crucible, covers it with a layer of powdered zinc, or, better, borax, and heats for ten minutes to dark

redness. The crucible is allowed to cool, is transferred with its contents into a flask, covered with hot diluted sulphuric acid, and heated rapidly to boiling. As soon as solution is effected the flask is closed, and when cool directly titrated with solution of permanganate of potassium. If the ore contains organic matter, it must first be roasted.

For the reduction of ferric to ferrous oxide the powder is more suitable, being more rapid than granulated zinc. It may be readily powdered in a mortar.—Ph. Centralh., August 1st, 1878, p. 290.

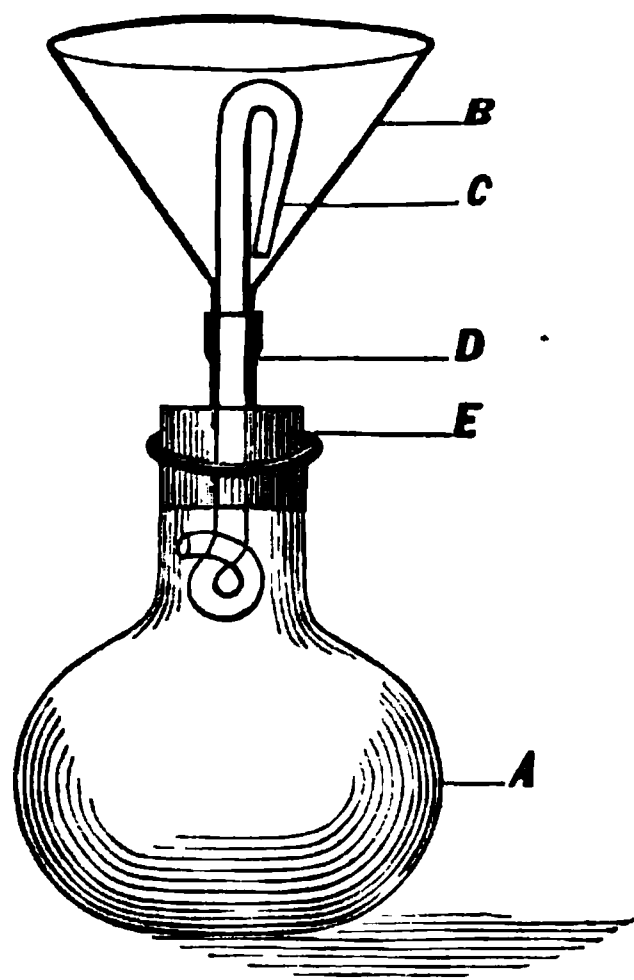
Iron—Variable Distribution of Sulphur and Phosphorus.—Sergius Kern has had opportunity of analyzing a piece of bar iron, 1 inch square by 44 inches long, for sulphur and phosphorus, which, as is well known, are diffused very unequally in iron, and also in steel. The bar being cut into seven equal parts, shavings of each were subjected to examination; the sulphur being determined as barium sulphate, and the phosphorus by the method of Eggertz, with the following result: Sulphur, 0.041, 0.042, 0.060, 0.055, 0.059, 0.042, 0.036 per cent.; phosphorus, 0.031, 0.025, 0.045, 0.026, 0.034, 0.037, 0.025 per cent.—Chem. News, September 20th, 1878, p. 145.

Ferrous Salts—New Form of Apparatus for their Production for Titration, etc.—The apparatus usually employed to procure the absence of atmospheric air during the solution of metallic iron in acids, consists of a flask fitted with a cork, through which is passed a tube bent twice at right-angles. When in use, the free end of this tube is made to dip below the surface of the water contained in a second flask or small beaker. The chief defects of this arrangement, to which Mr. W. F. K. Stock draws attention, are: 1. Want of portability. 2. Necessity for some form of support for tube. These objections are overcome by the author in the apparatus illustrated by the drawing (Fig. 48), which is described as follows:

A is a flask of 200 cc. capacity; *B* a glass funnel of 7 mm. diameter; *C* a glass tube of such size as just to pass through stem of funnel, *B*; *D* an india-rubber joint connecting *B* and *C*, and forming a perfectly tight joint; *E* an india-rubber stopper, bored so as to pass stiffly upon *C*. The construction is as follows: Having selected a tube of the proper size, the upper bend is turned on so that the point of the tube *C*, which should be

narrowed to 1.5 mm., falls into the apex of *B*. *B* is then placed in position and secured by *D*; the stopper *E* is next fitted on *C*, and finally the lower end of *C* is turned on, taking care to allow so much tube as will prevent *E* being injured by heat.

FIG. 48.



Apparatus for Producing Ferrous Salts.

In working the apparatus it is only necessary to place sufficient water in *B* to cover end of *C*, in order to secure exclusion of air. The most certain source of heat is the sand-bath. Using this, the author has never had a case of untimely regurgitation. Immediately the required solution is effected, the apparatus is removed from the source of heat, and recently boiled water is run into the funnel *B* to the required extent.—*Ch. News*, January, 1879, p. 48.

Ferrous Compounds of the British Pharm.—Mr. Henry Napier Draper draws attention to the fact, developed by a series of experiments made by him, that certain ferrous compounds of the British Pharm. cannot be obtained in a condition in which they will accurately respond to the test of that standard (titration with volumetric solution of bichromate of potassium). Ferrous arseniate, ferrous phosphate, and ferroso-ferric oxide (magnetic oxide of iron) all contained ferric compound in greater or less quantity.—*Yearbook of Pharm.*, 1878, p. 496.

Solution of Ferric Chloride—Modification of the Manipulation.—Mr. E. B. Shuttleworth, after alluding to the various difficulties that attend the preparation of solution of perchloride of iron on a considerable scale, gives the following modification in the manipulation, whereby the chief difficulty, liability to froth over, is overcome: The quantity of nitric acid specified by the Pharmacopœia is placed in the dish or pan, and the iron solution mixed with the proper quantity of hydrochloric acid is allowed to trickle in slowly. The oxidation is instantaneous, and takes place in the cold. The change from blackish-green to reddish-brown is very marked, and any deficiency in the quantity of nitric acid can be at once seen. On the large scale, the liquor may be best added with a siphon. With a bent-glass tube of five-sixteenths of an inch in diameter, the liquor from ten pounds of iron may be run in safely in twenty-two minutes, and requires no attention save the getting the siphon in operation. The final concentration may be performed on a water-bath.—Can. Ph. Jour., February, 1879, p. 205.

Ferric Hydrate — Effect of Freezing.—A lot of moist ferric hydrate having been left to drain on a calico filter by Mr. E. B. Shuttleworth during very cold weather, it was found frozen quite hard, and after thawing and rapidly draining it, it proved to be insoluble in citric acid. A portion of it was dried at a temperature of 90° F., and then constituted a granular dark powder, having much the appearance of fine-grain gunpowder, but inclining in color slightly to brown. It lost 27.2 per cent. of moisture when heated to dull redness. After standing some time the effect of solvents was tried. While readily soluble in hydrochloric and in nitric acids, it was very sparingly soluble in acetic and in citric. It has been proposed to reduce the bulk of ferric hydrate by freezing, with a view to facilitating subsequent washing. This observation, however, would seem to indicate that the ferric hydrate so produced is not suitable for all purposes for which it may be desired.—Can. Phar. Jour., August, 1878, p. 1.

COBALT.

Cobalt—New Test.—If a solution of a cobalt salt be mixed with cyanide of potassium, a cinnamon-colored precipitate takes place, the precipitate, as is well known, being soluble in a slight excess of the reagent, forming a clear yellow liquid. Mr. T. Tattersall has observed, that if now a few drops of yellow ammonium sul-

phide be added, a blood-red color is obtained, even in presence of nickel salt, or any soluble cyanide except the copper compound, which completely prevents the reaction. Colorless ammonium sulphide will not produce the red color. It may also be obtained, though not with the same degree of delicacy, by using Na_2SO_3 or SnCl_2 .—Chem. News, February 14th, 1879, p. 66.

NICKEL.

Nickel—Separation of Zinc.—F. Beilstein accomplishes the separation of zinc and nickel as follows: The sufficiently diluted solution of the nitrates or sulphates is mixed with ammonia till an alkaline reaction is obtained, and then acidified with pure citric acid. When the solution is perfectly cold sulphuretted hydrogen is introduced till the liquid has a distinct smell, which is generally effected in five or ten minutes. If much zinc is present sulphuretted hydrogen is introduced for five minutes at a time, letting the liquid stand after each introduction, and repeating this till the smell of gas does not disappear on standing. In this manner a needlessly long treatment with sulphuretted hydrogen, by which traces of sulphide of nickel may be carried down, is avoided. The precipitate of sulphide of zinc is allowed to stand for twenty-four hours in the cold, and is then weighed as such. The filtrate is evaporated to a small volume, and after supersaturation with ammonia the nickel is thrown down electrolytically, in which operation care must be taken that no sal ammoniac is present, as it hinders the precipitation of the nickel. The solution should be a nitrate.—Bes. d. d. Ch. Ges., No. 14, 1878; in Chem. News, February 14th, 1879, p. 74.

Oxide of Nickel— Ni_3O_4 .—H. Baubigny has obtained this oxide—corresponding to magnetic oxide of iron—by treating chloride of nickel at 440°C. ($= 824^\circ \text{F.}$) with moist oxygen. It appears as a gray, crystalline powder, and, unlike the corresponding iron compound, it is not magnetic. It is slowly attacked by hot hydrochloric acid, with liberation of chlorine, and at a strong heat it is reduced to protoxide, losing 6.6 per cent. of its weight.—Compt. Rend., December 30th, 1878; in Ch. News, January 31st, 1879, p. 53.

Nickel Plating.—Professor Stolba has previously given a method for nickel plating metallic objects with the use of a galvanic bat-

tery. The method consists in introducing the object into a solution of chloride of zinc and sulphate of nickel, boiling, and bringing in contact with metallic zinc. By this method the surfaces that come in immediate contact with the metallic zinc are liable to show spots, which subsequently have to be removed mechanically, and to this extent the process is defective. Professor Stolba now proposes to do away with the metallic zinc altogether, and thereby avoids the formation of spots. To a dilute solution of pure chloride of zinc (5–10 per cent.) sulphate of nickel is added until the solution is decidedly green; it is then heated—best in a porcelain vessel—to boiling, and, without regarding the turbidity that may be produced by the separation of basic zinc salt, the objects, completely deprived of fat, are introduced in such manner that there shall be as few points of contact as possible between them. The boiling is continued, with occasional additions of water to supply that which has evaporated, for 30–60 minutes. The boiling may be continued for hours without materially increasing the thickness of the nickel plating. The object is then washed with water containing some suspended chalk, and carefully dried. The solution of zinc must contain no metal that is precipitable by iron; it is best prepared, in absence of an article of known purity, by treating an excess of zinc scraps with pure muriatic acid, allowing the solution to stand twenty-four hours, so as to afford time for the deposition of metals precipitable by zinc, and filtering. 1 part of dissolved metal is equal to 2.1 parts chloride of zinc. The sulphate of nickel should also be as pure as possible, and must, particularly, contain no copper. The plating solution will deposit ferric oxide on standing, derived from the iron objects plated. This may be filtered off, and, after the addition of some chloride of zinc solution and of sulphate of nickel, may be used again.

Cobalt plating may be accomplished on polished iron or steel objects by substituting sulphate of cobalt for sulphate of nickel in the above process. The cobalt layer adheres also extraordinarily firm, and differs from the nickel coating only in having a faint reddish tinge.—Ph. Centralh., October 31st, 1878, p. 415.

INDIUM AND GALLIUM.

Indium and Gallium—Separation from Blende.—F. Jungfleisch separates these metals from blende as follows: The blende is roasted, dissolved in an insufficient quantity of sulphuric acid in

order that the saturated basic solution of zinc salt may leave the indium and gallium undissolved. The residue is then taken up by sulphuric acid. The strongly acid solution is then treated with sulphuretted hydrogen, the sulphides deposited are removed by filtration, and the filtrate is partially neutralized with soda, so that the liquid, while still containing free acid, will again give a precipitate with sulphuretted hydrogen. A dilute solution of monosulphide of sodium is then gradually added, and the mixture well shaken. Indium and gallium are thus precipitated along with sulphide of zinc, while aluminium and iron remain in solution. The precipitated sulphides are again taken up by sulphuric acid and reprecipitated by sulphide of sodium, whereby the indium and gallium are finally obtained, contaminated only with a little sulphide of zinc, from which it may be freed by well-known methods.—Ph. Centralb., June 19th, 1879, p. 243; from Ch. Centralbl., No. 15, 1879.

CHROMIUM.

Chromic Acid and Chromates.—E. Donath recommends the following method of recognizing free chromic acid and chromates together: 1. A drop of sulphate of manganese is added to a portion of the previously heated solution. In the presence of neutral chromates a heavy black-brown precipitate is produced. 2. Hyposulphite of sodium is added to a second portion of the heated solution. In the presence of bichromates a brown turbidity of superoxide of chromium is produced. 3. To a third portion of the solution,—not heated,—solution of iodide of potassium is added. In the presence of free chromic acid iodine is separated, and may be recognized by the violet color communicated to chloroform or bisulphide of carbon when agitated with the solution. Even trichromate of potassium ($\text{KO}, 3\text{CrO}_3$) is incapable of liberating iodine from iodide of potassium.—Zeitschr. Est. Ap. Ver., April 20th, 1879, p. 182.

Barium Chromate—Production of the Crystalline Salt.—L. Bourgeois heats to bright redness, for half an hour, two equivalents of chloride of barium and one equivalent of chromate of sodium, and allows the mass to cool slowly, when crystals of a pistachio-green are found in its interior. They are freed from the alkaline chloride by washing with boiling water. Their specific gravity is 4.60. They dissolve readily in dilute hydrochloric or nitric acid, giving an orange liquid. They are decomposed

by sulphuric acid, with formation of sulphate of barium and chromic acid, and consist of 60.4 per cent. of baryta and 39.6 per cent. of chromic acid, corresponding to the formula BaO, CrO_3 . The green color is not due to the presence of chromic oxide.—Compt. Rend., February 24th, 1879; in Chem. News, March 21st, 1879, p. 123.

ZINCUM.

Zinc—Preparation from Blende.—The following process is given in "Chemiker Zeitung" (No. 1, 1879): The blende is partly roasted, and is then treated in a muffle with burnt lime and coke. Calcium sulphide is formed, and the greater part of the zinc present in the ore is volatilized. This is collected as zinc oxide, as in the ordinary zinc furnaces. From the calcium sulphide sulphuretted hydrogen is evolved, and by its action upon the sulphurous acid gas given off on roasting the blende, sulphur is obtained.—Ch. News, March 21st, 1879, p. 124.

Zinc—Forensic Determination.—Chapuis has found that under the conditions resulting from the ordinary course of examinations for metallic poisons,—treatment with chlorate of potassium and hydrochloric acid, removal of free chlorine, neutralization with ammonia, acidulation with hydrochloric acid, and treatment of the solution with sulphhydric acid,—the zinc is found in the sulphhydric precipitates, and not in the acid solution, as might be expected. The author explains that during the process of oxidation, organic acids are formed; these on neutralization are united with ammonia, and on acidulation with hydrochloric acid are again liberated, while chloride of ammonium is formed. The acidity of the solution is consequently due to organic acids, and the zinc is in the most favorable condition to be precipitated by sulphhydric acid.—Ph. Centralh., October 24th, 1878, p. 403.

Crystalline Oxide of Zinc.—By heating the nitrate in a porcelain crucible, as in the instances of the alkaline earths (which see), G. Brügelmann obtained microscopic crystals of the oxide. These crystals form beautiful hemimorphous pyramids belonging to the hexagonal system. They are white or slightly yellow in color, and have brilliant surfaces. The specific gravity of oxide of zinc in this condition is 5.782 at 15° C. (= 59° F.), and the corresponding specific volume is 14.009.—Ann. Phys. Chem. (2), IV, 283–286; in J. Ch. Soc., October, 1878, p. 771.

CADMIUM.

Sulphide of Cadmium—Solubility in Sulphide of Ammonium.—Ditte has observed that sulphide of cadmium is soluble in sulphide of ammonium at the ordinary temperature, and that its solubility is increased as the temperature rises, and that it is much larger than in the case of sulphide of copper. For the separation of the metals soluble in sulphide of ammonium the author recommends the sulphide of sodium or potassa, in which both the sulphides of cadmium and of copper are insoluble. Cadmium should therefore be sought, in the analytical course, not only in the precipitate by hydrosulphuric acid, but also in the solution by sulphate of ammonium.—Ph. Centralh., February 20th, 1879, p. 74.

CUPRUM.

Copper—New Test.—Schönbein had noticed that copper salts in presence of cyanides gave a blue color with guaiacum. E. Purgotti has since found that cyanides may be replaced with the same effect by ferrocyanides, nitroprussides, sulphocyanates, and cyanates, and also alkaline chlorides, and chlorides of the alkaline earths. On this reaction he has based a test for copper. The solution, which must be free from all substances, such as ferric salts, etc., which color guaiacum blue, is mixed with a solution of an alkaline chloride, and poured gently down the side of a test-tube containing an alcoholic solution of guaiacum; if the most minute trace of copper is present a blue color is produced at the junction of the two liquids, and if the quantity of the copper is larger, the whole of the liquid becomes blue on agitation; in this way .001 of sulphate of copper in a decigram of water gives a distinct coloration. The action appears to be due to oxidation of the cupric chloride.—Gazz. Chim. Ital., 8, pp. 104–107; in J. Ch. Soc., September, 1878, p. 754.

Copper—Method of Imparting a Brown Color.—Dr. Ebermayer uses a solution composed as follows: 50 grams carbonate of ammonium, 25 grams crystallized acetate of copper, and 250 grams of vinegar are boiled down over one-half; 10 grams of sal ammoniac and 2.5 grams of oxalic acid are then added, and the whole being diluted with 0.75 liter of vinegar, it is boiled for some time. It is allowed to cool, and then filtered. The copper plates are boiled in this solution, whereby they become coated with a

handsome yellowish-brown layer of oxide. It is used principally for browning medals.—Ph. Centralh., August 8th, 1879, p. 297.

Sulphide of Copper—Composition.—Julius Thomsen finds that the precipitate formed in solutions of cupric oxide by means of sulphuretted hydrogen or sulphide of sodium is not CuS , but a mixture of sulphur with a lower copper sulphide. The affinity of copper for sulphur is satisfied with the formation of Cu_2S , which is accompanied by a liberation of heat to the extent of 20,240 cal., and the reception of a further quantity of sulphur takes place without noticeable rise of temperature.—Ber. d. d. Ch. Ges., No. 17, 1879; in Ch. News, April 25th, 1879, p. 185.

Ammoniacal Cupric Oxide—Oxidizing Action.—O. Loew has made the interesting observation that solution of cupric oxide in concentrated solution of ammonia—the solvent power of which upon cellulose is well known—possesses oxidizing action. Thus, if the solution is heated for half an hour in a capacious flask, containing air, nitrous acid is formed abundantly. This action may be explained that intermediate higher oxides of copper are formed, which immediately give up a portion of their oxygen to the ammonia. Furthermore, hyposulphite of sodium, when shaken with the ammoniacal copper solution with access of air, is rapidly converted into sulphate. Uric acid is decomposed into urea and oxalic acid; asparagin and glycocoll into oxalic acid and carbonic acid. The gradual change in alkaline solutions of cupric tartrato (Fehling's solution) is doubtless due to the oxidation of the tartaric acid.—Zeitsch. Oest. Ap. Ver., April 20th, 1879, p. 182.

PLUMBUM.

Lead—Estimation as Iodate.—Mr. Charles A. Cameron finds that iodate of lead is practically absolutely insoluble. Iodic acid and alkaline iodates precipitate lead far more perfectly than sulphuric acid, even when alcohol is added to the latter. The iodate of lead formed is weighed, or, if a volumetrical inertia be desired, the following is the process: Precipitate with standard solution of soluble iodate, and filter off the iodate of lead. The filtrate and washings are mixed, and the excess of iodic acid contained in them is estimated volumetrically by the hydrochloric acid and hyposulphate method. As it is almost impossible to procure pure iodic acid or iodate of potassium, the solution of the iodate must be standardized by means of a solution of pure nitrate of lead.

Owing to the slight solubility of iodate of lead in alkaline chlorides, iodides, and bromides, none of these salts must be present. HCl rapidly dissolves iodate of lead.—Ch. News, September 20th, 1878, p. 145.

Sulphate of Lead—Decomposition by Chloride of Sodium.—F. Matthey has observed that when sulphate of lead, litharge, and chloride of sodium are boiled together for some time the sulphate is partly decomposed, chloride of lead and sulphate of sodium being formed. The conversion does not take place with sulphate of lead and chloride of sodium alone, and it is evident that the presence of plumbic oxide is necessary to the reaction.—Arch. f. Ph., September, 1878, pp. 233–241.

TUNGSTEN.

Tungsten — Metallurgical Uses.—Many attempts have been made to improve the qualities of iron and steel by the addition of small proportions of other metals. The most promising of all the experiments made in this direction turn on the introduction of certain proportions of tungsten or of chromium. Mr. E. W. L. Biermann, who has devoted a great amount of time and expense to a thorough study of tungsten and chromium, finds that either of these metals may be advantageously incorporated with iron in the Bessemer process. He melts 3600 kilos of gray pig iron in a reverberatory furnace, and decarbonizes it in the converter in the usual manner. He then mixes it with 200 to 300 kilos of a previously prepared alloy of tungsten, or of chromium, and iron. By this procedure he escapes all loss of tungsten or chromium by oxidation, and obtains a tungsten or chrome steel, in which either of these metals appears to be substituted for the carbon ordinarily present. This tungsten steel has been found to resist a greater breaking strain than the best "Huntsman's steel." Puddled steel and iron and cast metal can also be decidedly improved in quality by additions of tungsten.

Tungsten further enters into the composition of other valuable alloys—bronze, minargent, etc., the latter being composed of 100 parts copper, 70 nickel, 5 tungsten, and 1 aluminium. It is said to combine the color and lustre of silver with the hardness of steel. Tungsten exists in abundance in Cornwall.—Ch. News, October 25th, 1878, p. 203.

Tungstic Acid—Preparation.—G. Thenius takes 50 parts of

finely pulverized wolframite, and digests it in a flask upon the sand-bath with 2 parts of pure concentrated hydrochloric acid and 1 part of pure concentrated nitric acid, shaking it from time to time. It is then diluted with an equal quantity of distilled water and filtered, and the residue once more digested with aqua regia. It is filtered again, the residue washed upon the filter with distilled water, and digested with ammonia until the tungstic acid is completely dissolved. The whole is then thrown upon a filter, upon which a mixture of silicic and niobic acid remains. The filtrate after standing for twenty-four hours deposits a yellowish-white precipitate, which is removed by filtration, and the filtrate evaporated to crystallization. The crystals of tungstate of ammonium thus obtained are heated in a flat porcelain capsule till the ammonia is expelled. The yield from 50 parts of the mineral proved to be 21 parts tungstic acid.—*Chemiker Zeit.*, June 6th, 1878; in *Ch. News*, July 26th, 1878, p. 47.

MOLYBDENUM.

Molybdic Acid—Value of the Blue Solution as a Reagent.—Mr. O. Maschke observes that if molybdate of calcium is moistened with a small quantity of dilute hydrochloric acid sufficient to produce a clear solution on the application of heat, a deep-blue coloration quickly appears in the liquid. In place of molybdate of calcium those of ammonium, sodium, or potassium may be used, adding so much hydrochloric acid that the liquid if poured upon a plate of polished marble may produce a visible but very slight effervescence. If, after cooling, a concentrated solution of chloride of sodium or calcium is poured into the liquid, a blue-black precipitate, not easily distinguished from the liquid, is formed, which may be regarded as a compound of molybdic acid and molybdic oxide. This dissolves with great ease, not merely in water but also in alcohol, and produces an intensely colored solution, which the author finds serves an excellent purpose as a reagent. The solution, which is not very stable, is prepared as follows: 3 grams molybdate of calcium, 250 cc. of water, and enough hydrochloric acid to effect the solution of 2 grams of cane or grape sugar, are boiled for five minutes after the blue coloration is apparent. The precipitate is then produced with chloride of sodium or calcium; it is washed upon a filter, first with the precipitant and then with a little water. As soon as the liquid begins to

run through of a deep color, the filter with its contents is placed in distilled water, and the solution finally made up to 250 cc. This blue solution is decolorized with extreme ease by caustic alkalies and oxidizing agents, such as chlorine, nitrous acid, peroxide of hydrogen, and permanganic acid. Hydrochloric acid of sp. gr. 1.24 produces in this solution a blue precipitate, the supernatant liquid being colorless. Sulphuric acid of sp. gr. 1.840 does not give a precipitate, but the color of the liquid is altered. Nitric acid of sp. gr. 1.185 produces a rapid decoloration. Dilute solutions of ferric salts decolorize, and those of ferrous salts occasion turbidity. These reactions may render the blue solution of some value as a reagent. The author also finds the following

Modification of Schœnn's Process for the Detection of Molybdic Acid to be exceedingly convenient. According to Schœnn traces of molybdic acid and its compounds are discovered by the blue coloration produced on heating it with concentrated sulphuric acid in a porcelain capsule. Maschke's modification is as follows: A little concentrated sulphuric acid is applied to a piece of platinum foil, bent so as to form a slight depression; upon the acid is placed a little of the substance in powder, and the foil is heated till vapors escape in abundance; it is then allowed to cool and repeatedly moistened with the breath. When after cooling only minute blue spots are visible, the sulphuric acid after being breathed upon takes an intense blue coloration. On heating the platinum foil the blue color vanishes, but reappears on cooling. It is completely decolorized if a considerable quantity of water is added. This modification is more certain as well as more convenient than the original test.—*Moniteur Scient. Quesn.*; from *Zeitsch. f. Anal. Ch.*, in *Ch. News*, July 12th, 1878.

BISMUTHUM.

Bismuth Residues.—Mr. E. A. Letts has subjected some bismuth residues to examination which had been submitted to him for the purpose by Mr. Schacht. These residues had been left on dissolving commercial bismuth in dilute nitric acid (2 parts strong acid and 3 parts water), and, being comparatively considerable, are quite unusual. Analyses showed them to be composed of selenium, tellurium, silver, gold, and bismuth, with traces of copper, and that they are probably a mixture of the selenides and tellurides of these metals. The quantity of tellurium has

not been definitely determined, but it certainly amounts to 12 per cent., and probably reaches 20 per cent.; selenium was present to the amount of about 17 per cent., silver, 5 per cent., gold, 2 per cent., and bismuth, about 44 per cent. The original metal proved to be part of a parcel of crude bismuth which had been imported from Australia and refined in England.—Ph. J. Trans., November 16th, 1878, p. 405.

Subnitrate of Bismuth—Preparation.—A. Lalieu has devised the following process whereby a preparation of constant composition is obtained: 200 grams of bismuth are dissolved in the usual manner in the requisite quantity of nitric acid, the solution decanted from the insoluble matter and poured into about 8 liters of water containing 500 grams of ammonia-water. The bulky white precipitate is washed, transferred to a capsule, and heated on a water-bath for fifteen or twenty minutes with 50 or 60 grams of caustic soda dissolved in a little water, whereby dense yellow anhydrous oxide of bismuth is formed. This is well washed by decantation, and afterwards mixed with continued agitation with sufficient nitric acid added in small quantities, equal to 48.5 grams of nitric anhydride; should the mixture become too hard, a little water is added, sufficient to impart a pasty consistence, and again heated in the water-bath for a few minutes, when it becomes perfectly white and rather more liquid. It is then diluted with a little water, collected upon a filter resting upon a linen support, washed with about twice its volume of water, expressed and dried. The yield is about 265 grams.—A. J. Ph., October, 1878, p. 475; from L'Union Phar., August, 1878.

Subnitrate of Bismuth—Causes of Variability in Composition.—Alf. Riche has investigated the causes of the variability of the composition of subnitrate of bismuth. Operating with bismuth, to which 1 and 2 per cent. of lead had been added, and following the process of the French Codex (evaporating the nitric acid solution to two-thirds and adding to 40 or 50 times its volume of water), he obtained the most satisfactory results with *distilled water alone*. Under these circumstances, the product contained 15.10 per cent. N_2O_5 , and was free from lead. When the *common water of Paris* was used, the product contained 12.42 to 13.78 per cent. N_2O_5 , and traces of lead; the same with *ammonia*, leaving an acid reaction 9.80 to 11.80 per cent. N_2O_5 , and about $\frac{1}{2}$ per cent. lead; *ammonia* in slight excess, 0.60 to 2.09, N_2O_5 , and large percentage of lead; *well-water containing lime*,

chiefly sulphate, 7.79 to 11.68 N_2O_5 , 0.056 of lead, as sulphate, and 0.719 sulphate of calcium.

The author regards the product containing the highest percentage of N_2O_5 as the most useful, and concludes that only distilled water should be used for the precipitation of the subnitrate, or such water as is free from lime; the bismuth remaining in the mother liquor may be recovered by precipitation with an alkali. Should the bismuth contain silver or lead, the former may be removed from the acid liquor before concentration by a few drops of hydrochloric acid, the latter by sulphuric acid.—Ibid., p. 476; from Jour. de Ph. et de Chim., August, 1878.

Subnitrate of Bismuth — Determination of Lead.—Carnot has recently proposed for the determination of lead from subnitrate of bismuth, to dissolve 10 grams in hydrochloric acid, concentrate the solution to a syrupy consistence, add a little sulphuric acid, and then alcohol, which will retain the chloride and sulphate of bismuth in solution while the sulphate of lead is precipitated. Chapuis and Linossier have found this method defective, and propose the following process: 3 grams of the subnitrate are boiled with 4 cc. of a 10 per cent. solution of caustic soda, and sufficient (about 4 cc.) of a 10 per cent. solution of yellow chromate of potassium to render the liquid yellow. The clear liquid is decanted, and the residue again boiled with 1 cc. of soda solution, a few drops of chromate, and 2 or 3 cc. of water. The liquid is filtered, and the filtrate acidulated with acetic acid, when chromate of lead is precipitated. One-fiftieth per cent. of lead may thus be detected if the acidulated filtrate is permitted to cool.—A. J. Ph., October, 1878, p. 477; from Journ. de Pharm. et de Chim., August, 1878.

Subnitrate of Bismuth—Detection of Lead.—Chapuis and Linossier recommend the following method for determining the presence of lead in subnitrate of bismuth: 3 grams of the suspected compound are mixed with 4 cc. of a 15 per cent. solution of soda and as much of a 10 per cent. solution of yellow chromate of potassium (about 4 cc.) as may be necessary to leave the supernatant liquid yellow after boiling. The liquid is decanted, the residue is boiled again with 1 cc. soda solution, a few drops of the chromate and 2 to 3 cc. distilled water, and is then filtered. On the addition of acetic acid to distinct acid reaction to the filtrate, a yellow turbidity is produced in the presence of lead. 1 per cent. of lead furnishes, under these conditions, a copious precip-

itate; 0.1 per cent. a distinct turbidity, and after a time a precipitate; with 0.02 per cent. the turbidity is faint and does not appear until after the filtrate has cooled, since the chromate is slightly soluble in the warm solution of acetate of sodium. By using larger quantities of the bismuth compound, smaller percentages of lead may be determined. The method is rapid, and may be made quantitative by using about 10 grams of subnitrate of bismuth, treating as above, washing the precipitated chromate of lead, drying at 100° C. ($= 212^{\circ}$ F.), and weighing. The weight multiplied by 0.6408 gives the quantity of lead contained in the 10 grams of subnitrate. Among 12 samples of the subnitrate examined by the authors, only one contained considerable quantities of lead (0.7–0.8 per cent.).—Schweiz. Wochenschr. f. Ph., November 1st, 1878, p. 388.

Bismuth Subnitrate—Presence of Lime.—A. Th. Starting draws attention to the presence of lime in subnitrate of bismuth. From experiments made, he concludes that the lime was introduced into the bismuth compound in the endeavor of the manufacturer to secure all the bismuth remaining in the acid solution by the addition of lime-water, and mixing the precipitate so obtained with that obtained by precipitation with water alone. Operating in this way, Mr. Starting obtained a product containing lime.—Arch. f. Ph., November, 1878, p. 411.

Subnitrate of Bismuth—Incompatibility with Alkaline Bicarbonates.—Mr. Thomas Green has made some experiments to determine whether the evolution of carbonic acid observed in mixtures of subnitrate of bismuth and alkaline bicarbonates is due to the action of free acid present in the subnitrate, or to the reaction of that salt with the bicarbonate. His experiments show that independently of any free acid that may be present in subnitrate of bismuth owing to insufficient washing, (1) that an admixture of this bismuth salt with the alkaline bicarbonate or carbonates results in mutual decomposition; (2) that when the carbonates are used decomposition without effervescence ensues; and (3) that when the bicarbonates are used, decomposition with liberation of CO_2 takes place.

In dispensing such mixtures the author considers that it is clearly the duty of the compounder to complete as far as possible the decomposition before sending out the mixture (thereby avoiding possible explosion of the vial, since the reaction requires some

time). This may be partially effected by rubbing the two salts in a mortar with a little hot water, until the liquid is cold.—Ph. J. Trans., December 21st, 1878, p. 505.

ARSENICUM.

Arsenic—Chemical Cause of its Poisonousness.—The peculiar action of arsenic, when taken internally, has heretofore been explained by supposing that it combines with the albumen of living organs, and therefore unfits them to perform their functions. Professor Binz, however, calls attention to the fact that arsenic or its oxides does not enter into combination with albumen outside of the body. Besides, he, in conjunction with Dr. H. Schulz, has just concluded a series of investigations which have shown that arsenious acid is oxidized to arsenic acid, and the latter immediately again deoxidized in the lymphatic organs, at the temperature of the living body. Hence there occurs in the living tissues a rapid exchange of nascent oxygen, which causes a destruction of the organs unless interrupted. It appears to act like nitrogen dioxide in the manufacture of sulphuric acid, where this body acts as a carrier of oxygen, and it is probable that upon this property depends the remedial action of arsenious acid.—New Rem., June, 1876, p. 179; from Pharm. Zeit., 1879, No. 26.

Arsenic—Volumetric Determination.—The form in which arsenic, when isolated, is often determined, is the ammonio-magnesian arseniate. A. Millot and Maguene have observed that the precipitation is rarely complete even in presence of a great excess of magnesia, and that in the filtrate, after concentration and acidification, hydrosulphuric acid produces a slight yellow turbidity of sulphide of arsenic. Further, the precipitate cannot be ignited, but must be weighed with the filter. The authors propose as a substitute the volumetric process already in use for phosphoric acid. It is known that, in a neutral or slightly acid liquid, arsenic acid is completely precipitated at the boiling-point by acetate of uranium. If the reagent is added drop by drop, complete precipitation becomes apparent when a drop of the liquid, brought in contact with a drop of ferrocyanide of potassium solution, gives a brown tint; and if the uranium solution has been standardized with a known quantity of pure arsenic acid, the quantity of arsenic in the liquid is readily calculated. The uranium solution should be quite dilute (about 20 grams of

acetate of uranium to the liter) on account of the high equivalent of arsenic acid; each cc. of such a solution precipitating about 5 milligrams of arsenic acid. The solutions of acetate of sodium and of ferrocyanide of potassium are of the same strength as those employed for phosphoric acid. The ferrocyanide should have been prepared recently. The process requires that the arsenic should be completely separated from all the bases with which it may form compounds insoluble in weak acetic acid. This end is easily attained by decomposing, with pure fuming nitric acid, the arseniuretted hydrogen which the substances produce in Marsh's apparatus. After two hours the volatilization of the arsenic is generally complete, as may be ascertained by igniting the gas escaping from the apparatus. The liquid which contains all the arsenic at the maximum stage of oxidation is thus evaporated to dryness, redissolved, mixed with 10 cc. of acetate of sodium, and titrated with uranium. If the arsenic is mixed with antimony, the latter is deposited during the evaporation, and does not interfere with the subsequent process.—Comp. Rend., June 3d, 1878; in Chem. News, July 12th, 1878, p. 21.

Arsenic — Separation from Antimony.—Professor R. Bunsen points out as a source of error in the determinations of arsenic, that the ammonio-arsenate of magnesia retains its crystalline water a little below 100°C. ($=212^{\circ}\text{F.}$) to the extent almost of an atom, but gives it up at temperatures between 102° and 105°C. ($=215.6^{\circ}$ and 221°F.). If this compound is to be used as a means of separation, it is preferably dissolved upon the filter in nitric acid, and the solution, after evaporation to dryness in a platinum crucible, is converted by heat into a bibasic arseniate of magnesia, and weighed as such. Still, all such determinations of arsenic cannot lay claim to an even moderately satisfactory degree of accuracy, since the ammonio-arsenate of magnesia, like the sulphate of baryta, obstinately retains salts from the precipitating liquids, and a prolonged washing with ammonia is impracticable, since 30 cc. of the latter dissolve about 1 milligram of the precipitate. Many of the determinations of antimony, as hypoantimonic acid, are also inaccurate. The temperature at which antimonious acid passes into hypoantimonic acid borders very closely upon that at which the latter begins to be resolved into oxygen and antimonious acid. Professor Bunsen, therefore, rejects these methods of determination as well as the processes

for the separation of arsenic and antimony hitherto in use, and proposes the following:

The sulphides of arsenic and antimony, while still moist, are dissolved upon the filter in an excess of solution of potassa, which must have been purified by means of alcohol. The solution, together with the concentrated washings, is introduced into a porcelain crucible holding about 150 cc., and a rapid current of chlorine introduced into the liquid through a hole in the watch-glass, which serves as a cover till all the alkali is neutralized. The crucible, still covered with the watch-glass, is heated in the water-bath, and concentrated hydrochloric acid in great excess is dropped in by means of a pipette. The liquid is evaporated down to half its bulk, the loss is again made up with an equal volume of concentrated hydrochloric acid, and the liquid is again concentrated down to one-half or one-third, in order to expel all free chlorine. It can now be diluted to a perfectly limpid solution by the addition of very weak hydrochloric acid, without tartaric acid, which interferes with the separation. To this solution there are now added for every decigram of antimonious acid probably present, about 100 cc. of a recently prepared and *saturated* solution of sulphuretted hydrogen, when pentasulphide of antimony is precipitated immediately or after a short time, according to its larger or smaller proportion. As soon as this precipitate has separated, the excess of sulphuretted hydrogen is immediately removed from the solution by forcing through it a violent current of air filtered through cotton-wool. This is easily effected by means of the blast of a glass-blowing table. To prevent loss by spirting, the beaker must be kept covered with a perforated watch-glass, the air-pipe entering through its aperture. In about 15 to 20 minutes the air is expelled, and the liquid becomes inodorous. The precipitate is then thrown upon a weighed filter and washed with the filter-pump, the filter being filled in succession eight or ten times with water, twice with alcohol, four times with sulphide of carbon, and finally three times with alcohol. The precipitate is dried at 110°C. ($= 230^{\circ}\text{F.}$) in the salt-bath, at which temperature it remains for any length of time perfectly constant in weight. The washings, even in not very experienced hands, do not require more than an hour. The filtrate which contains the arsenic as arsenic acid does not retain the least trace of antimony. The antimonial precipitate may, in certain cases, retain quite insignificant traces of arsenic. But if after washing

with water it is redissolved in hydrate of potassa, and the process of separation repeated, the antimony is obtained free from any trace of arsenic. The determination of arsenic in the filtrate is no less simple. The collected liquid, after the addition of a few drops of chlorine, is heated on the water-bath, and treated with a prolonged current of sulphuretted hydrogen, both whilst hot and during cooling. The precipitate is allowed to settle for a day at a gentle heat, and is then placed on a weighed filter. If care has been taken to leave a sufficient excess of sulphuretted hydrogen in the liquid during its heating and cooling, the resultant precipitate consists of a little sulphur and arsenic pentasulphide, without the least admixture of trisulphide. Before weighing, it is treated exactly like the antimonial precipitate. Its composition and weight are constant after drying at 110° C. ($= 230^{\circ}$ F.).—Liebig's *Annalen.*, 1878; in *Chem. News*, August 30th, 1878, p. 113.

Metallic Arsenides.—Mr. A. Deschamps's experiments show that some metals do not form definite compounds with arsenic, but alloys which lose arsenic on heating. The arsenides can be prepared by heating the metal with arsenic under a layer of fused boric acid, or by fusing an arsenate with cyanide of potassium. Attempts to reduce the arsenates by the action of hydrogen or carbonic oxide at a high temperature, did not yield satisfactory results. The arsenides of silver, gold, and copper may also be obtained by immersing metallic arsenic in solutions of the salts of these metals.

Arsenide of silver, Ag_3As , is obtained in the form of a white, brittle, very hard, crystalline metallic button, specific gravity 8.51, when arsenate of silver is gently fused with cyanide of potassium. It loses arsenic on heating, forming a new compound, having the specific gravity 9.01; fused under a layer of boric acid at a higher temperature it is converted into Ag_3As , specific gravity 9.51.

Arsenide of gold, Au_3As , is deposited in the form of a dark-red powder when metallic arsenic is placed in a solution of chloride of gold. By fusion with cyanide of potassium, a yellow, metallic button, of Au_3As , (specific gravity 16.2) is obtained.

Arsenide of copper, Cu_3As , is obtained by the reduction of arsenate of copper by cyanide of potassium at a low temperature, or by the action of arsenuretted hydrogen on sulphate of copper. It is a bluish-gray, crystalline, friable, metallic body, having a

specific gravity of 6.94. Metallic arsenic throws down from a solution of sulphate of copper a black precipitate of arsenide, which becomes crystalline on fusion, and has the composition Cu_3As_2 , specific gravity 7.76. By the direct union of copper and arsenic under a layer of boric acid, the brittle compound Cu_3As is obtained. It has a specific gravity of 7.81, and oxidizes on exposure to the air. Heated with boric acid, this arsenide loses arsenic, and forms the steel-gray, brittle, and crystalline compound Cu_6As .

Arsenides of Lead.—These readily oxidize on exposure to air, and should, therefore, be preserved in water or in a hydrocarbon. PbAs (specific gravity 9.55) is obtained by the reduction of the arsenate. Pb_3As_4 , formed by the direct union of the two metals, has a specific gravity of 9.65. On heating this compound with boric acid, it yields Pb_3As_4 (? Pb_4As_3), and has the specific gravity 9.76, and at a higher temperature yields Pb_2As .

Arsenide of nickel, Ni_3As_2 ,—specific gravity 7.71,—obtained by the reduction of the arsenate, is a brilliant, crystalline, metallic body. On fusion with boric acid it is converted into Ni_3As , which can also be prepared by fusing together a mixture of cyanide of potassium, arsenic, and oxide of nickel.

Arsenide of cadmium, Cd_3As_2 ,—specific gravity 6.26,—is obtained by reducing the arsenate as a white metallic button, having a faint reddish tinge.

The *arsenites of iron* are not well-defined compounds.

Arsenide of zinc, Zn_3As_2 (forming brilliant octohedral crystals); *arsenide of bismuth*, Bi_3As_4 (specific gravity 8.45); *arsenide of antimony*, Sb_3As (specific gravity 6.46, a crystalline body resembling antimony in color); and *arsenide of tin*, Sn_3As_2 (a crystalline, brittle body, specific gravity 6.56), were obtained by the direct union of arsenic and the respective metals.—Compt. Rend., 86, pp. 1022, 1023, 1065, and 1066; in J. Ch. Soc., September, 1878, p. 705.

ANTIMONIUM.

Antimony—Rapid Determination.—The following rapid way of determining antimony in ores is given in Zeitschr. f. Anal. Chem.: The ore is melted with carbonates of sodium and potassium, and with sulphur; the filtrate from the hot aqueous extract is decomposed with hydrochloric acid, and the precipitate of antimony

sulphide is converted into antimoniate of antimonie oxide.—*Chemiker Zeitung*, May 16th, 1878; in *Chem. News*, July 5th, 1878, p. 11.

Sulphur Auratum—*Simple Test for the Presence of Arsenic*.—Equal parts by weight of bicarbonate of sodium and golden sulphuret of antimony (about 1 gram) are triturated intimately together, the mixture is shaken with cold distilled water for several minutes, filtered, and the filtrate treated with excess of hydrochloric acid. In the presence of arsenic a yellow precipitate of sulphide is deposited.—*Ph. Centralh.*, May 1st, 1879, p. 181; from Böttger's *Polyt. Notizbl.*

HYDRARGYRUM.

Mercury—Occurrence and Working of Ores.—The following, from "*Dingl. Polyt. Journ.*," vol. 229, pp. 168–173, as abstracted in "*J. Chem. Soc.*," November, 1878, p. 842, is of sufficient interest to find a place here, though bringing nothing that is absolutely new:

"The principle of the preparation of mercury from ores is very simple. It suffices to ignite the ores in closed vessels with lime for the removal of the sulphur, and to condense the vapors formed, or to undertake the desulphuration by merely introducing air, whereby the sulphur is burnt to sulphurous anhydride, the latter passing into the atmosphere. The main difficulty is the condensation of the mercury vapors, an operation which has not yet been effected without great loss, although many improvements have been made in this direction.

"The chief districts for the production of mercury are: Almaden in Spain, Santa-Clara in California, Idria in Austria, and formerly Zweibrücken in Bavaria. According to the most recent accounts mercury ores have been found in quantity in Borneo. In Bavaria the ores were distilled with lime in retorts with clay receivers containing a small quantity of water. Ure afterwards improved on this plan by using cast-iron retorts fitted with a tube, from which the vapors were passed into a condenser. For the desulphuration by burning with access of air, an apparatus is recommended, consisting of large brick chambers, in which ore and fuel are piled up in alternate layers, whilst air is introduced through openings at the bottom. The mercury gradually collects in the upper part of the mass, and when this is rich enough it is washed to obtain the metal. The loss is about 12 per cent., but

in numerous other forms of apparatus constructed on a somewhat similar principle the loss is far greater. At Santa Clara, California, an improved form of condenser has been tried. The apparatus consists of a large chamber, in which the greater part of the flue-dust is deposited, and of three smaller chambers connected with the larger one, and communicating with one another at the top and bottom alternately. These chambers subsequently open into a series of smaller chambers in connection with the main shaft.

“In 1870 Pellet constructed an apparatus in which the vapors pass through a long system of chambers, where they are thrown down with artificial rainfall. This method seems to give the most satisfactory results, the condensation being so complete that the escaping vapors do not contain even a trace of mercury.

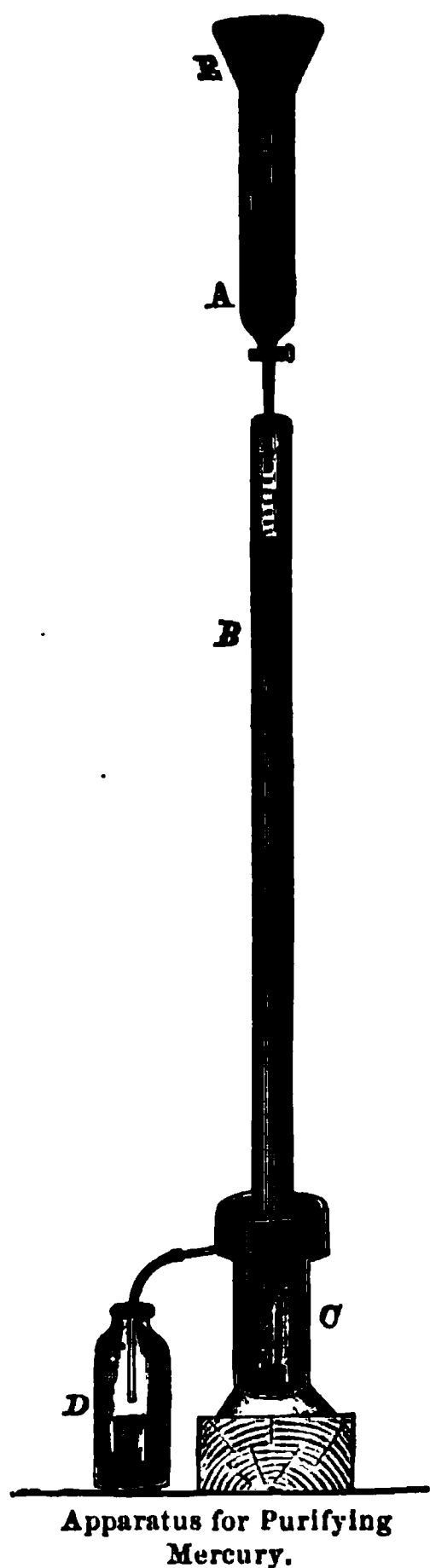
“In conclusion, an account is given of the principal localities at which mercury mines exist. It is shown that North America produces one-half of the total quantity of mercury brought into commerce, Spain and Austria being the next largest producers. The quantity of mercury produced in 1876, in the whole world, amounted to a total of 126,600 bottles, containing 34.7 kilos per bottle, of which North America produced 62,200 bottles, Spain 41,700 bottles, and Idria 8000 bottles.”

Mercury—Purification.—Professor Lothar Meyer purifies mercury by means of a moderately dilute solution of commercial crystallized ferric chloride, in the apparatus shown by Fig. 49. The mercury flows from the stoppered tube *A*, in a very fine stream into the tube *B*, which is 3 to 4½ feet long, of a diameter of about 1½ inches, and is filled with the solution of ferric chloride. This tube stands in a vessel, *C*, containing mercury, which must be at least $\frac{1}{12}$ th, or, better, $\frac{1}{10}$ th as high as the tube *B*, so that it may contain sufficient mercury to balance the column of ferric chloride solution. This vessel is provided with a lateral tube, as shown in the cut. If the mercury is very impure, it is first filtered through a filter, perforated with a pinhole, into the tube *A*. From thence it is allowed to fall, in very fine drops, into the solution of ferric chloride, and after traversing the latter arrives at the bottom in minute drops, which do not at once coalesce, as they are covered by a thin coat of chloride or subchloride. But the pressure of the succeeding globules forces them gradually below the edge of the tube *C*, whereby at the same time the thin incrustation of the

globules is left behind, so that only pure brilliant mercury flows over into the receptacle *D*. Occasionally it may be necessary to

repeat the operation.—*New Rem.*, June, 1879, p. 173; from *Ber. d. d. Ch. Ges.*, 1879, p. 437.

FIG. 49.



Mercury — New Method of Purification.—The unsatisfactory results with the ordinary methods of purification by the wet way, and the trouble occasioned when purification by repeated distillation is resorted to, have led J. W. Brühl to search for a method that should be convenient as well as satisfactory. This he accomplished by the aid of chromic acid, by the oxidizing effect of which the contaminating metals are readily removed. 1 liter of water, 5 grams bichromate of potassium, and a few cc. of sulphuric acid are shaken vigorously with an equal volume of mercury. The metal is reduced to small globules, while a very small part of it is converted into red chromate. The agitation is continued until the red powder has disappeared and the aqueous solution has acquired a pure green color, due to sulphate of chromium formed. By means of a powerful current of water, which is passed into the flask, the gray powder upon the surface of the mercury, which is composed of the oxides of the metallic impurities, is washed away. The process of oxidation is then repeated once or twice, according to the degree of impurity, until gray powdery oxides are no longer formed.

The mercury is finally completely washed with distilled water until it remains perfectly clear.

Since chromic acid seems to oxidize the common metals by preference, and any chromate of mercury formed appears to take part in their oxidation, the loss of mercury is inconsiderable. Experiments made with pure mercury show that the loss by this

method is not likely to exceed 0.5 per cent.—Schweiz. Wochenschr. f. Ph., March 28th, 1879, p. 111.

Mercury—Mechanical Purification.—Dr. Vulpius draws attention to a simple method of removing impurities from mercury, which have accumulated in such that is used in the collection of gases. A small plaited filter of strong paper is made, the lower part of the cone is perforated with about ten coarse needle-holes, and having been placed in a funnel, the mercury is poured on; as soon as the column of mercury is high enough it exerts sufficient pressure to force the pure mercury through the needle-holes, leaving the mechanical impurities upon the filter. By shaking the greater part of the small portion of mercury remaining in the filter may be caused to pass through the perforations, and the insignificant quantity remaining will find application for other purposes. Washing with water, alcohol, ether, and subsequent drying with filtering-paper, does not answer near as well as the simple method proposed.—Arch. f. Ph., September, 1878, p. 230.

Calomel—Conversion into Corrosive Sublimate.—C. Slop, referring to recent experiments on the effect of various substances in converting calomel into corrosive sublimate (see Proceedings, 1878, p. 417), gives the result of some experiments recently made by him in the same direction. By his first experiment he endeavored to show in what respect calomel was changed in contact with the gastric juice. The latter in its normal condition contains about 2 p. hydrochloric acid and 5 p. chloride of sodium in 1000 parts. Solutions of hydrochloric acid and of the salt, the one containing 2 p. of the acid and the other 5 p. of salt in 1000, were digested for 6 hours with calomel (1:100 solution). The acid solution produced from 1 gram calomel 3 milligrams corrosive sublimate, the salt solution 1 milligram under the same conditions.

Calomel being sometimes given in fruit jellies, etc., the action of citric acid was determined: 1 gram calomel, 2 grams citric acid, 100 grams water, digested as above, gave a solution containing 1 milligram corrosive sublimate.

The contents of the intestines being alkaline, and calomel being, moreover, administered with magnesia not unfrequently, the effect of these was tried. 0.5 gram caustic soda, 1 gram calomel, 100 grams water, digested 6 hours at 40° C. (104° F.) gave 6 milligrams of corrosive sublimate; 1 gram carbonate of sodium

substituted for the caustic soda in the above, gave 4 milligrams; 1 gram magnesia gave 3 milligrams when treated as above; and when rubbed with 1 gram of calomel dry and allowed to remain for 24 hours, 1 milligram of corrosive sublimate was produced.

These experiments prove that alkalies and their carbonates decompose calomel readily, and produce considerable quantities of the poisonous compound. On this account also, calomel pastilles, when prepared with sugar that is not sufficiently refined (containing probably hydrate of lime), may become dangerous when long kept.—Schweiz. Wochenschr. f. Ph., July 26th, 1878, p. 263.

Calomel—Conversion into Corrosive Sublimate.—Referring to the experiments of Jolly (see Proceedings, 1878, p. 417), Dr. Vulpinus communicates the following observations, made in 1872:

1. There is no corrosive sublimate formed in mixtures of calomel with saccharum album, saccharum lactis, magnesia usta, magnesia hydrico-carbonica, sodium bicarbonicum, after 24 hours.

2. No corrosive sublimate is formed after three months in mixtures of calomel with magnesia usta, or magnesia hydrico-carbonica, and any desirable quantity of sugar.

3. Traces of corrosive sublimate, although insignificant, are formed in the course of three months in a mixture of calomel, sodium bicarbonicum, and saccharum lactis.

4. Considerable quantities of corrosive sublimate are formed during the same period in a mixture of calomel, sodium bicarbonicum, and saccharum album, due to absorption of moisture.

5. By digestion with water, corrosive sublimate is formed only in such calomel powders that contain magnesia usta or sodium bicarbonicum.

6. Formation of corrosive sublimate does not take place when calomel is digested for a short time with water containing hydrochloric acid; on the contrary, the decomposition of calomel in its admixture with alkalies is decreased in proportion to the saturation of the latter by hydrochloric acid.—Arch. f. Ph., April, 1879, p. 347.

ARGENTUM.

Spongy silver for dentists' use may be obtained, according to Professor Böttger, if tartrate of silver is heated upon a platinum or copper plate until decomposed, and then to redness over a Bunsen's

burner. A mass answering the same purpose is obtained if coins, containing much copper, are acted upon by an insufficient quantity of nitric acid to completely dissolve the metals.—Ph. Centralb., January 2d, 1879, p. 11.

Chloride of Silver—Reduction.—It is generally assumed that the reduction of chloride of silver to metal when it is brought in contact with sulphuric acid and zinc, is due to the hydrogen in the nascent state. Dr. Tommasi, however, finds that hydrogen plays no active part in this change, the decomposition being caused partly by the zinc and partly by the heat generated by the reaction between the zinc and acid. Indeed, zinc will decompose chloride of silver which has been simply moistened with water. Hydrogen is perfectly indifferent in its behavior to chloride of silver; but if the latter is heated at the same time, metallic silver and hydrochloric acid are produced. The reaction requires 11,800 units of heat, and this is the reason why hydrogen cannot react upon the chloride in the cold. For the same reason, also, neither bromide nor iodide of silver are decomposed by hydrogen at the ordinary temperature, since the first requires 17,238 units of heat, and the last absorbs 24,650 units. Among the halogen compounds of silver, therefore, the chloride requires the smallest number of units of heat for its decomposition, notwithstanding that a higher degree of heat is required than for the decomposition of the bromide or iodide.—Zeitschr. Est. Ap. Ver., June 20th, 1879, p. 275.

Nitrate of Silver—Contamination with Gold.—Mr. E. B. Shuttleworth has observed that all commercial refined silver contains gold, though perhaps in the most minute quantity. If such silver is dissolved in ordinary nitric acid containing traces of hydrochloric acid, both metals will be dissolved, and, as long as the solution is acid and concentrated, minute quantities of both chloride of silver and chloride of gold will be retained. Crystals deposited from the liquor will also contain traces of gold. Such crystals have a faint purplish tinge, as also the solution, so that in color it resembles water containing a very small quantity of logwood ink. The author is not prepared to say in what particular form or combination the gold exists in the silver salt, nor yet to state the effect of this impurity on the photographic film. He suggests, however, that possibly some of the troubles of photographers, as, for instance, that technically known as fogging,

might, in some degree, be due to the presence of this contamination. Nitrate of silver containing gold may be purified by fusion, resolution, filtration, and recrystallization.—*Can. Phar. Jour.*, November, 1878, p. 103.

PLATINUM.

Metals of the Platinum Group.—H. Sainte-Claire Deville and H. Debray have communicated the results of their studies upon the dissociation of the oxides of the platinum group (*Bullet. de la Soc. Chim. de Paris*, 5 Septembre, 1878, p. 150), of which the following is an extract:

Platinum is distinguished from all metals associated with it in its ores, in that it does not form direct compounds with oxygen under any conditions.

Rhodium, *palladium*, and *iridium* show a different behavior. When they are heated in a muffle, they combine with oxygen, provided the temperature is not too high, and lose it again by increasing the heat.

Osmium and *ruthenium* combine directly with oxygen. The product of oxidation is volatile, and is formed at the highest temperatures.

Osmium, which has been heated very strongly to redness, although not so liable to change as that obtained at a lower temperature, is changed to osmic acid even at the ordinary temperature, and always at higher temperatures.

Ruthenium reacts precisely like osmium. When heated strongly to redness in a muffle, it is oxidized at about 400° C. (= 712° F.), and volatilizes in considerable quantities; in what condition, however, it is difficult to say, for the substance gives off the odor of ozone, the formation of which is always attendant on the decomposition of superruthenic acid. The residue in the muffle is always ruthenic oxide. Ruthenic oxide sublimes in crystals when it is heated in a porcelain tube in a current of oxygen, or when substances containing ruthenium are so treated. Even the metal itself, though one of the most permanent substances, is rapidly vaporized in a muffle, particularly at a high temperature. Several grams so treated lost 24 per cent. in a few hours.

These properties distinguish osmium and ruthenium most decidedly from the other metals of the platinum group. They

approach arsenic and antimony in their behavior to oxygen, and might, therefore, be included in that group. With rhodium, palladium, and iridium it is different. These, when once oxidized, permit, because they again lose their oxygen by heat, the determination of the laws of their dissociation, and the tension which is by it at different temperatures.—*Zeitschr. Oest. Ap. Ver.*, February 10th, 1879, p. 67.

Metals of the Platinum Series.—Mr. George Matthey, whose firm has been intrusted with the manufacture of the iridio-platinum necessary for the manufacture of the international meter and kilogram standard and the geodesique rule, contributes a highly interesting paper on the methods and means employed to obtain pure platinum and iridium, and on the satisfactory production of their alloy, iridio-platinum. Speaking of the platinum group of metals, he remarks, *en passant*, that it is a curious fact that the group should consist of three light and three heavy metals, each division being of approximately the same specific gravity,—the heavier being (in round numbers) just double the density of the lighter series. Thus osmium, iridium, platinum form the first division, having the respective specific gravities of 22.43, 22.39, 21.46, whilst ruthenium, rhodium, palladium are represented by the figures 11.40, 11.36, 11.00; the average densities of the heavy and light divisions thus being respectively 22.43 and 11.25. But a more interesting and important classification is what the author designates as a first and second class series, from the more important view of their relative properties of stability. Thus platinum, palladium, and rhodium form the first or higher class, not being volatilizable in a state of oxide; iridium, osmium, and ruthenium forming the second or lower class, their oxides being more or less readily volatilized. The (volatilization?) oxide of iridium is effected at 700° to 800° C., and entirely decomposed at 1000° , whilst osmic and hyporuthenic acids are volatilized at the low degree of 100° , the latter exploding at 108° . The chlorides of these metals can be sublimed at different temperatures—as also the protochloride of platinum. The author's methods of purification of iridium and platinum are chiefly founded upon these distinguishing characteristics. These methods, as well as the course pursued in the final production of

Iridio-platinum, are not suited for extraction; but the following in reference to the iridio-platinum may properly find place here.

The alloy, after having undergone various manipulations, was finally composed as follows :

	I.	II.
Platinum,	89.40	89.42
Iridium,	10.16	10.22
Rhodium,	0.18	0.16
Ruthenium,	0.10	0.10
Iron,	0.06	0.06
	<hr/>	<hr/>
	99.90	99.96

From which is deduced :

	Proportion.	Density at zero.	Volume.
Iridio-platinum at 10 per cent.,	99.88	21.575	4.603
Iridium, in excess,	0.23	22.380	0.010
Rhodium,	0.18	12.000	0.015
Ruthenium,	0.10	12.261	0.008
Iron,	0.06	7.700	0.008
	<hr/>	<hr/>	<hr/>
	99.90		4.644

The density at zero, calculated after No. 1 analysis,	. 21.510
" " " " " No. 2 "	. 21.515

The author found the density by absolute determination to be 21.516, and the calculation thus coincided perfectly with the practical results obtained.

Iridio-platinum alloy has now been proved to possess the following among many advantages for standard rules and weights: It is almost indestructible, has extreme rigidity, especially in the tube form (which the author has now prepared), and a most beautiful polished surface can be obtained upon it; its coefficient of elasticity is very great, whilst for standard weights its high density is a valuable quality, and for these the author would recommend an alloy of not less than 20 per cent. iridium.

The results he has arrived at in preparing alloys of higher grades, viz., 25, 30, 40, and 50 per cent. of iridium, are as follows :

The alloy of 20 per cent. iridium is malleable and ductile almost without limit. 25 per cent. can only with great difficulty and waste be worked into sheet and wire when heated at low temperatures; 30 per cent. and 40 per cent. with great difficulty only at a temperature little less than melting-point, being brittle when cold, but with a grain of great beauty and fineness. 50 per cent. he has as yet

failed to work up into forms other than castings, beyond what could be effected by pressure when in a semifluid condition.

The general result of his work leads the author to make the following recommendations:

For the manufacture of standard rules, to use an alloy of not less than 85 per cent. of platinum and 15 per cent of iridium, adopting the tube form.

For the standard weights, to use an alloy of not less than 80 per cent. of platinum and 20 per cent. of iridium, adopting the form now generally made.—Ch. News, April 25th, 1879, p. 175.

ORGANIC CHEMISTRY.

HYDROCARBONS.

Peculiar Crystalline Products (Hydrocarbons) Obtained from American Petroleum.—At the Centennial Exposition a handsome green body, composed of magnificent crystals, was exhibited by Mr. Herbert Tweddle, of Pittsburg, as a product obtained during the refining of petroleum. This product, which appears to be the greenish-yellow coloring matter and the fluorescent principle of petroleum, was named *petrocen* by Tweddle, and yielded by sublimation and suitable fractioning a number of other bodies, *thallen*, *carbocen*, *carbopetrocen*, etc., but the nature of these, as well as of the original compound, was but imperfectly understood. For this reason the entire quantity (several kilograms, the product of 50,000 barrels of petroleum) was placed into the hands of L. Prunier and R. David, who now communicate some of the results of their research. They found that the products above named—*petrocen*, *thallen*, *carbocen*, and *carbopetrocen*—are mixtures of various hydrocarbons, which may by the methodical use of solvents, etc., be separated into paraffins and into non-saturated hydrocarbons. Among the latter the authors have recognized by the aid of picric acid and dinitroanthracen, as also by their melting-points, boiling-points, and solubilities, anthracen, phenanthren, chrysen, chrysogen, etc. The paraffins have a high melting-point (70° , 80° , and even 85° C. = 158° , 176° , 185° F.), while ordinary paraffins melt below 65° C. (= 149° F.).

The so-called petrocen is quite heavy, its sp. gr. being 1.206, and it is resolved into hydrocarbons, as above stated, that have sp. gr. ranging between 0.990 and 1.30. Some of these hydrocarbons gave on elementary analysis an extremely high percentage of carbon (88 to 96 per cent.), higher in fact than any other hydrocarbons that have been hitherto examined. Some of them have now been obtained in a state of purity, and the authors hope soon to determine the nature of their chief derivatives. At present they are prepared to say that these interesting compounds form the highest members in the hydrocarbon series, and it is apparent that among the by-products of the industrial treatment of petroleum, the same hydrocarbons of the acetylen and benzol series are found that are found among the products of the distillation of coal.—Ph. Centralh., April 7th, 1879, p. 137.

Mineral Wax (Ozocerite) in Utah.—Professor J. S. Newberry draws attention to the recent discovery of deposits of ozocerite in Utah. According to a communication of Professor J. E. Clayton these deposits occur in the Wahsatch Range, on the headwaters of the Spanish Fork, east from the south end of Utah Lake. The material has been found saturating beds of brown and bluish shales, probably of Tertiary age, and in masses of various dimensions, more or less mingled with clay. These shales extend from the San Pete Valley in a north-northeast direction for a distance of fifty or sixty miles, and the width of the area or basin which they occupy is at the middle point about twenty miles. The shale beds richest in paraffin vary in thickness from twenty to sixty feet, but there is no considerable accumulation of that substance on the surface, nor would this be possible, as it would be destroyed by the autumnal fires which sweep the country. Professor Clayton has examined portions of this region two years ago for coal, and he found in the oil shales a few thin seams, and saw the waxlike exudation in several places, but only in small quantity. Other parties in Salt Lake informed Professor Newberry that the paraffin itself is sometimes twenty feet thick, and that the quantity is enormous, but Professor Clayton says that such statements are not authorized by any facts which have come under his observation.

Professor Newberry has named this earth-wax of Utah *ozocerite*. It has been stated to be *zietrisikite*, but examination made by Mr. Spencer B. Newberry have proved this to be a mistake. The

melting-point of the hydrocarbon was found to be 61.5°C. ($= 142.7^{\circ}\text{F.}$), while zietrisikite is known to melt at 90°C. ($= 194^{\circ}\text{F.}$). Besides, the latter is insoluble in ether, while ozocerite, as is the present hydrocarbon, is completely dissolved by a large quantity of boiling ether.—A. J. Ph., June, 1879, p. 319.

Petroleum—Solidification.—"Les Mondes" mentions a very curious effect that is produced on the oils of petroleum, even those of the least gravity, by the addition of powdered soapwort (saponaria). On digesting the powder with water and mixing it with the oil the latter forms a very thick mucilage, so that the vessel in which the experiment is made can be turned upside down without spilling the contents. What is still more singular is that if a few drops of carbolic acid be added and the mucilage shaken it becomes perfectly limpid again in a few minutes.—Drug. Circ., January, 1879, p. 31.

VOLATILE OILS, RESINS, ETC.

Volatile Oils—Detection of Alcohol.—A. Drechsler uses a solution of 1 part of bichromate of potassium in 10 parts of nitric acid of sp. gr. 1.30. This new reagent shows the presence of even the smallest traces of alcohol in ethereal oils, as on its addition there is evolved, along with the specific odor of the oil, the well-known pungent smell of nitrite of ethyl-oxide, whilst, at the same time, a very characteristic change of color occurs, which is very different, according to the quality of the different oils, and is best observed by using for the experiment small porcelain capsules shaped like a watch-glass. Five to six drops of the oil in question are poured into a capsule, two or three drops of the reagent are added, and the whole is allowed to stand. In certain oils a remarkably beautiful play of colors appears in the mixture.—Chem. Zeit., No. 29, 1878; in Ch. News, August 9th, 1878, p. 71.

Essential Oils—Preservation.—Mr. J. B. Moore makes some practical observations on the preservation of essential oils, as well as on their quality and the conditions in which they are often found in the shops. He recommends that what is not needed for immediate use should be transferred to *small bottles, which should be filled so full that the cork will touch the oil.* The cork should be tied down to prevent its expulsion or working out, and then sealed, or, what is preferable, dipped into a melted mixture of two parts of paraffin and one part of yellow wax, or

into melted paraffin alone.* The corks employed for this purpose should be carefully selected, sound, and accurately adjusted to the neck of the bottle. The oil should then be *immediately placed in a dark, cool place in the cellar*.—Drug. Circ., August, 1878, p. 134.

Essential Oils.—In a review of the exhibits relating to pharmacy at the late International Exhibition in Paris, in "Ph. Jour. Trans." (October 12th, 1878), an interesting account of the industrial production of essential oils, perfumery, etc., in France is given. The following information, embraced in the review mentioned, is taken from a pamphlet of M. Lautier, fils, of Grasse, and is worth particular attention:

Angelica oil is distilled from the root of the angelica plant; 150 to 200 kilos of roots yield 1 kilo of essential oil.

Oil of celery (ol. apii) is distilled only from wild plants, about 400 kilos of which yield 1 kilo of oil.

Tarragon Oil.—The Tarragon plant (*Artemisia dracunculus*) is cultivated on a large scale in the neighborhood of Grasse. There are two crops in the year; the first in July, and the second in October. 300 to 500 kilos, according to season and location of culture, yield 1 kilo of oil.

The *fennel plant (Foeniculum vulgare)* grows wild in the South of France, and is generally distilled in July and August. 500 kilos of the plants yield about 1 kilo of essential oil.

The *rose geranium (Pelargonium roseum)* is grown in the environs of Grasse, but on a larger scale in Algeria. The plant grown in France yields the finer oil, but it is much dearer, as more than 1000 kilos of the plants are needed for 1 kilo, while only 800 to 1000 kilos of the Algerian flowers are required for the same quantity.

Hyssop (Hyssopus officinalis) is grown in the environs of Grasse in large quantities. 1 kilo of oil can be got from 400 to 500 kilos.

Cherry laurel trees are cultivated at Grasse, and the leaves are distilled in the month of August, chiefly for the sake of the cherry laurel water.

* A good material for sealing essential oils, as also for alcoholic or ethereal liquids, particularly collodion, etc., is gelatin melted with just sufficient water. Good glue will also answer; and may be colored, if desired, by some suitable pigment —REP.

Lavender (*Lavandula vera*) grows on the mountains which cover the southeastern corner of France and part of Piedmont, not further west than the river Rhone, and not beyond the 44th degree of northern latitude. The best quality of oil is drawn from flowers grown on the highest points of the chain which has given its name to this department, "Alpes maritimes." The flowers are cut in July and August. 150 to 200 kilos of flowers give 1 kilo of essential oil when the season is favorable.

Spike lavender (*Lavandula spica*) grows in the same districts; the oil obtained from it has a more camphorlike smell than that from *L. vera*.

Origanum creticum grows on the mountains of Southern France. About 300 to 500 kilos yield 1 kilo of essential oil.

Parsley grows in the environs of Grasse. 250 to 300 kilos yield 1 kilo of oil.

Thyme, or *serpolet* (*Thymus serpyllum*) is distilled in July and August. 400 to 500 kilos yield 1 kilo oil.

Red thyme (*Thymus vulgaris*) grows wild on the mountains of the Mediterranean coast; it is distilled during the whole year, but chiefly from May to August, when the plants yield the most and finest oil. About 300 kilos are needed for 1 kilo of oil.

White thyme oil is the result of the rectification of red thyme oil.

Marjoram (*Origanum majorana*) grows wild in the mountain valleys. 1 kilo of essential oil can be obtained from 400 to 600 kilos.

Peppermint (*Mentha piperita gallica*) is cultivated in the territory of Grasse with all possible care. The production is considerable, and the essential oil is much esteemed. 400 to 500 kilos yield 1 kilo oil.

Myrtle (*Myrtus communis*) grows in great quantity on the hills surrounding Grasse, and is distilled in September, about 300 kilos producing 1 kilo of oil.

Oil of "neroli bigarade" is distilled from the flowers of *Citrus bigarade*, which are brought in during the month of May. In the best years 1000 kilos of fresh flowers yield 1 kilo of essential oil. The finest trees yield about 30 kilos of flowers.

Oil of "neroli Portugal" is distilled from the flowers of *Citrus aurantium*.

Oil of "petit grain bigarade" is a product of the leaves of the bitter orange tree. The most esteemed oil is got in the months

of June, July, and August from the fresh leaves. About 500 kilos yield 1 kilo of oil.

Oil of "petit grain Portugal" is got from the leaves of the sweet orange tree.

Rosemary grows in fine bushes, wild, on the mountains of Southern France. It is also cultivated as an ornamental plant, and distilled nearly the whole year through; but the best quality is obtained in May. 150 to 200 kilos of leaves yield 1 kilo of oil.

Rose.—The culture of roses in the neighborhood of Grasse has taken an enormous development. 10,000 kilos of roses produce hardly 1 kilo of essential oil. This oil is green, and has greater consistence than the Oriental otto. The roses grown here are mostly distilled for the sake of rose-water. They are also used to some extent for manufacturing pomades and oils.

Rue (*Ruta graveolens*) grows in abundance in the neighborhood of Grasse. The leaves require to be handled with the greatest care, or they provoke painful swellings. 150 to 200 kilos produce 1 kilo of oil.

Savin oil is obtained by distillation of a bush (*Juniperus sabina*), which grows in the southern regions of France. 300 to 400 kilos produce 1 kilo of oil.

Sage (*Salvia officinalis*) grows wild, but is cultivated also in the environs of Grasse. It is distilled in September. About 300 kilos produce 1 kilo of oil.

Verbena is cultivated in the gardens of Grasse, and distilled in August.

The following flowers are not distilled, but their perfume is extracted by enfleurage:

Jasmin flowers are gathered from July to October from a little bush cultivated in the gardens of Grasse. It is very sensitive to temperature and ground, and requires much care and watchfulness. The more the plantations are exposed to the sun the more powerful is the perfume of the flowers.

The *tuberose* blooms in the same season. The culture gives a great deal of trouble, as every year, in November, the bulbs must be taken out to guard them from humidity and cold, and replanted in April. The produce in good years reaches 2500 kilos per hectare.

The *reseda* (*mignonette*) plant is delicate, and the crops fail often in consequence of late colds. Mignonette is sown in De-

ember, and commences flowering in March. The flowers gathered in March and April give the finest perfume.

The *jonquille* blooms in March. The flower, of a fine bright-yellow color and sweet odor, is worked in the same way as the *jasmin* and *tuberose* flowers, by the "cold enfleurage process," which has been described in previous reports (see Proceedings, 1876, p. 275).

The *violet* employed in perfumery is the so-called double variety. It is cultivated on a large scale in the shadow of the olive trees which cover the territory of Grasse. The flowers are gathered in February and March. The harvest is subject to climatic influence, and varies much, for while in some years more than 100,000 kilos are brought in, not even the fourth part of that quantity is the result of other crops.

The *lily of the valley* and the *narcissus* grow wild in the environs of Grasse. The former is gathered in February and March, and the *narcissus* in April. The pomades prepared with these flowers are very useful to the manufacturing perfumer.

Cassie is a gold-colored, sweet-smelling flower, gathered from a small tree (*Acacia farnesiana*), which adorns, in large quantities, the declivities on the seaside. The tree begins to give flowers about the end of August, and continues, the weather being favorable, until about the end of the year. The operations on this flower conclude the Grasse perfumery season.

An interesting account of the production of *oil of peppermint*, as practiced in M. Hanart's establishment at Auzin (Département du Nord), is given in the same review: The cultivation of peppermint is now carried on in the Auzin district to a considerable extent. An acre of land produces annually from three to four tons of the herb. The crop is cut in the full sunshine during the month of May, made up into little shocks, and left on the field several days. After all admixtures of other herbs have been carefully removed the entire plants are packed into the still, which is heated by a steam jacket or spirals, and of about 66 gallons capacity, and distilled as rapidly as possible in order not to acquire a herbaceous taste. Five hundred parts of the herb yield about one part of a colorless or greenish-yellow oil, having a very agreeable, piquant odor. This is purified by several washings with cold water, and by exposure to the air during several weeks in a cool, dark place. After this it is rectified, and then kept in bottles,

secluded from light and air, for some years, before being sent to market. The oil of peppermint, so prepared, is alleged to successfully rival the English oil, both as to quality and price.

The "*mélisse citronelle*" (*Melissa officinalis*) is distilled here to obtain a water, but this plant yields scarcely any oil. On the contrary,

The *Moldavian balm* (*Dracocephalum Moldavicum*) yields about one-eighth per cent. of a strongly aromatic and very agreeable essential oil. This product is said to be hardly known in commerce, that usually sold under the name of

Essence de mélisse being obtained from an Indian species of *Andrapogon*.

Abietene.—Professor Samuel P. Sadtler has had opportunity to examine an oil of turpentine from San Francisco, said to be derived from *Pinus ponderosa*, belonging to the class of yellow or pitch pine, in which is found the familiar *Pinus australis* of the Southern States. The latter being the source of our common English oil of turpentine, contains as its distinctive constituent the hydrocarbon *australene*. The Californian oil, however, was found to answer more nearly to the character of the variety of oil of turpentine described by Professor W. T. Wenzell in 1872, under the name of abietene, and which was obtained from *P. sabiniana*, Dougl., inhabiting the Sierra Nevada Mountains and the Coast-range of California. Like Wenzell's abietene, the present specimen differs from ordinary oil of turpentine, in having a strong penetrating odor, bearing some resemblance to oil of orange; in having a specific gravity of 0.6974 (abietene 0.694; common oil 0.84 to 0.86) at 165° C., and in boiling at 101° to 103° C. (abietene 101° C., common oil 156° to 161° C.), etc.

Although the quantity of oil was too small to permit a thorough study of its characters, a number of experiments were made with a view to more detailed comparison with the ordinary oil of turpentine. It was found optically active, rotating the plane of polarization slightly (-1.58°) to the left (common oil $+18.6^\circ$; French oil -35.40° ; Venetian oil -5.2° ; templin oil -76.9°). Treated with gaseous HCl, the abietene under consideration remained for the greater part unchanged; the greater part distilled over at a temperature of 105° C., and showed but a trifling opalescence when tested with silver nitrate. A small quantity of brownish oil, which did not distil at 160° C., was probably a monochlor-

hydrate of abietene, but an accident prevented the positive determination. Unlike common oil of turpentine, abietene does not form a crystalline hydrate when treated in the usual manner. Sulphuric acid appears to be without action upon this abietene. No definite compound was obtained by the action of nitrosyl chloride. After passing the latter through a portion of the oil, cooled by a freezing mixture for two hours, a small white substance was obtained, which was found, however, to be largely composed of chloride of sodium (used in the generation of the nitrosyl chloride). The question of the nitroso compound must therefore remain unsettled until larger quantities of abietene are obtained, when this as well as other points can be settled. At present it appears to be a type of a new group of terpenes.—A. J. Ph., April, 1879, p. 176.

Referring to the above notice, Professor Sadtler draws attention to a paper by Mr. T. E. Thorpe,

On heptane from Pinus sabiniana, which would seem to render further experiments by Professor Sadtler unnecessary, and which has been extracted by him (from Ch. News, April 25th, 1879), as follows:

“In the ‘Pharmaceutical Journal,’ March 30th, 1872, W. Wenzell described, under the name Abietene, a new hydrocarbon obtained by distilling the exudation of the *Pinus sabiniana*, a tree indigenous to California, known locally as the nut pine or digger’s pine. To procure the exudation, the tree during winter is notched and guttered at a convenient height from the ground. The resin on distillation yields the hydrocarbon. The crude oil is met with in San Francisco as an article of commerce, under the name of abietene, erasine, etc., as a substitute for benzolin, for removing grease-spots, etc. It is a nearly colorless mobile liquid, of a powerful aromatic smell, resembling that of oil of oranges. Wenzell contrasts its characters with those of terebene from *P. sylvestris*. Abietene, sp. gr. 0.694 boils at 101°, dissolves but a small quantity of hydrochloric acid gas, and is but little attacked by cold nitric acid. Terebene, sp. gr. 0.840, boils at 160°, absorbs HCl with avidity, and is violently attacked by nitric acid. From a consideration of the general properties and behavior of this hydrocarbon, the author of the present paper concluded that it was likely to be a paraffin. The occurrence of a paraffin playing the part of oil of turpentine in the vegetable kingdom was hitherto unheard of, the only natural sources of this

hydrocarbon (heptane) being petroleum and fossil fish oil. The author therefore obtained from Mr. Wenzell two gallons of the abietene, and has subjected it to a most exhaustive chemical and physical examination, the details of which are contained in the paper. The crude oil is slightly contaminated with a resinoid matter, to which its smell is due. The pure oil boils at 98.42°C . at 760 mm. It has the composition of heptane, containing 83.85 per cent. C, 16.03 per cent. H (C_7H_{16} requires C 83.97, and H 16.03). Vapor density, found, 49.94; calculated, 50.07, sp. gr. at 0° , 0.70057. The rate of expansion by heat has been carefully determined; its volume at the boiling-point is 1.1411. Its specific volume 162.54; refractive index for D, 1.3879; its molecular refractive energy, 56.4. Rotates in a tube 200 mm. + $6.9'$. Its viscosity and surface tension were also determined. The author has compared the heptane obtained from *P. sabiniana* with the heptane from petroleum and that obtained by heating azelaic acid with baryta. The sp. gr. of the heptane from petroleum is 0.7301; that from azelaic acid has a sp. gr. of 0.700. These heptanes are believed by Schorlemmer to be identical. The author is at present engaged in an investigation of this point."—A. J. Ph., June, 1879, p. 293.

Oil of Lemon—Apparatus for Extraction.—The editor of "New Remedies" (March, 1879, p. 74) draws attention to the apparatus of Dominico Monfalcone for the extraction of oil of lemon, principally with the view to suggest to some enterprising American a method by which the essential oils of the Citrus family may be extracted in the Southern States. The apparatus will yield from the same quantity of lemons double the quantity of oil that is obtainable by the older methods, which are also described, at the same time saving an immense amount of labor; and the author considers it not improbable that it may still be improved upon. It is called in Italian *strizzatore termo-pneumatico* (thermo-pneumatic extractor), and is described as follows (see Fig. 50):

A is a hollow cylinder of sheet iron, the interior surface of which is studded with a large number of metallic knife-points. This cylinder revolves on two axles attached to it at diagonally opposite points. Its capacity is such, that when half charged, as indicated in the cut, it is capable of holding 1200 to 1500 lemons. The cylinder having been properly charged, say with the above-stated amount of lemons, together with a small quantity of water,

a vacuum during the first revolutions of the cylinder. Steam being now cautiously admitted into the double walls of the cylinder, the water is raised to boiling at a comparatively low temperature, and the vapors charged with the essential oil rapidly pass over into the receptacle. The product is said to be equal in quality to that obtained by mechanical means alone. With a two-horse power engine and a boiler designed for a five-power engine, five such apparatuses may be driven at once, and the operation, including the time required for charging and emptying, is completed in three-quarters of an hour. As before stated, the yield is double that obtained by the sponge process, by which a workman can extract not more than 2300 lemons in a working-day of 10 hours.

During the months of November to March, the average yield from 1000 lemons in the factories in Palermo is 320 grams of essential oil; in those of Messina, where a better quality of fruit is employed, the yield is almost 400 grams. The same number of lemons yield about 40 liters (10 gallons) of acid liquor, which, of course, is utilized for citric acid.

Distilled Oil of Lemon—Characters and Composition.—In a former paper Mr. W. A. Tilden had given an account of experiments made upon essential oil of lemon with a view to ascertaining the nature of the hydrocarbons of which it consists. The observations were confined to the essential oil of commerce, which is obtained in Sicily and Calabria from the rind of the fruit by excoriation and expression, without distillation, and which is believed to have been as good as could be procured. The optical character of this oil, as well as chemical test, having revealed the undoubted presence of an appreciable quantity of a turpentine, the author was glad to have the opportunity to examine some essential oil, distilled for him from the fresh peel by Mr. John Moss, with a view to determine whether the turpentine found was a natural component of the oil or not. Two portions were obtained by Mr. Moss, one of 3.5 ounces from 47 pounds of peel; the other of 8.5 ounces from 52 pounds of peel; the larger yield from the latter being ascribed to the difference in manipulation, which in this instance consisted in thoroughly crushing the peel under stone runners before distillation. Both oils had the same specific gravity (0.852 at 20° C. (= 68° F.)), but differed very slightly in their action on polarized light. Their color was pale yellow, and the odor deliciously fragrant, and superior to the foreign oil. The

two oils being mixed were subjected to fractional distillation, and by this and other complicated operations the following substances were recognized :

1. *A turpentine* ($C_{10}H_{16}$) agreeing in general properties with terebinthene, the chief constituent of French turpentine oil. This could not be entirely separated by fractional distillation, neither could it be completely purified, and therefore the quantity of it cannot be stated, but a rough estimate would represent it at perhaps 5 per cent. of the original oil.

2. *A characteristic hydrocarbon* (a terpene $C_{10}H_{16}$), for which, perhaps, the name *citrene* may be retained, constitutes at least 70 per cent of the crude oil. This, when pure, differs very little from the corresponding terpene of the orange as to odor, and it boils at the same temperature, viz., $176^{\circ} C.$ ($= 348.8^{\circ} F.$); but it is distinguished by several peculiarities: It readily forms crystals of terpin hydrate when treated with nitric acid and alcohol according to Wigger's process, which the hesperidene of oil of orange does not, and it is further distinguished by the action of strong sulphuric acid, which, with hesperidene, forms a viscid product which cannot be distilled below $240^{\circ} C.$ ($= 464^{\circ} F.$), while citrene yields by the same treatment a large quantity of an optically inactive hydrocarbon, boiling at the same temperature (at or about $176^{\circ} C.$ ($= 348.8^{\circ} F.$)).

3. *Cymene*, about 6 per cent.

4. *An oxidized compound*, $C_{10}H_{16}O$, or $C_{10}H_{16}OH$, boiling at a little over $200^{\circ} C.$ ($= 392^{\circ} F.$), agreeing in general with terpinol, but, unlike the latter, it is optically active (dextrogyrate). It composes 10 to 15 per cent. of the crude oil.

5. *Viscid residues of the distillation*, consisting partly of the polymeric hydrocarbons, and probably also of a compound ether, which is decomposed by heat into a hydrocarbon ($C_{10}H_{16}$) and acetic acid.

Mr. Tilden's results agree to a certain extent with the observations of Blanchet and Sell, Deville and Berthelot, made many years ago. The peculiar terpene—citrene—is being further examined.

Distilled oil of lemon deposits none of the greasy matter commonly met with in ordinary oil of lemon.—Ph. J. Trans., February 8th, 1879, p. 654.

The reading of Mr. Tilden's paper before the Pharmaceutical

Society, having attracted considerable attention to "distilled essence of lemon," Mr. John Moss contributes some details of the distillation as conducted by him: "It was supposed that the peel of six hundred lemons would yield the weight of essence required by Dr. Tilden, viz., eight ounces, and that quantity, weighing forty-seven pounds, was accordingly operated upon as soon as received into the laboratory. It was placed in a small copper still, capable of holding thirty gallons, covered with cold water, and heat applied. Twelve gallons of liquid were distilled over into an earthenware receiver, from which, when the oil was judged to have separated, the water was run off below into a similar vessel. The oil, not quite free from water, was allowed to stand in a separating funnel, and when all the water was removed measured three and a half ounces. This result was disappointing, as it did not come up to half the estimated yield. No more oil had appeared on the surface of the separated water, and accordingly ten pounds of salt were dissolved in it with the hope that a further separation might be promoted thereby. The expedient was futile, though the solution stood over night. In the morning the liquid, salt and all, was returned to the still, from which the peel had not yet been removed, and twelve gallons were again drawn over. Not a single drop of oil was obtained from this distillate."

The next lot was first crushed, as stated in Mr. Tilden's paper, and only a single lot of 12 gallons of distillate was obtained without the use of salt. The increased yield—8½ fluid ounces from 600 lemons, weighing, however, in this instance, 52 pounds—is doubtless due to the crushing in part, but, nevertheless, the peel must have been richer in oil. Doubtless more favorable results will be obtained with recent lemons; those taken by Mr. Moss were at least nine months old, and had not only lost oil in ripening, but also in keeping.

In the discussion above referred to there appears considerable difference of opinion as to the higher fragrance of the distilled oil. Mr. Moss observes that the distilled oil does not appear as fragrant, perhaps, as the ordinary when tested by smelling at the neck of the bottle; but when rubbed in the hands, as the fashion of the expert is, the fruity fragrance of the distilled oil passed out of comparison with anything the imported could furnish.—Ph. J. Trans., March 24th, 1879, p. 198.

Oil of Rosemary—Preparation.—C. O. Cech gives an interesting

account of the production of oil of rosemary in the island of Lesina. In this island the plant attains a height of 30 to 62 cm., and where it is carefully cultivated 125 cm., the stems having a diameter of 2 to 3 cm. The glands, filled with the ethereal oil, are situated on the under side of the leaves. The manufacture of this oil in Lesina is increasing daily. Although no positive data exist as to the production of this oil, it is nevertheless known that Lesina ten years ago sent out 30,000 florins (Austrian) worth of it. Every third year the biennial sprouts of the rosemary shrub are clipped in the month of May, the branches being dried for a week in the sun, and then deprived of their leaves. The distillation of the oil is made in copper stills, placed close by the seashore, and heated over an open fire. Before charging the still the dried leaves are moistened with water. The oil volatilizing with the vapors of water passes through a worm and is collected in bottles. After separating the water from the oil the latter is filled into tin vessels and sent to Trieste. Rosemary oil is mostly used in perfumery, but is also added in small quantity to olive oil; the latter suffers no loss in value for technical purposes by this treatment, while the high duty imposed on olive oil is avoided. From Trieste 17,000 to 20,000 kilos of rosemary oil are annually brought into commerce, at an average price of two florins per kilo. In France and Spain an alcoholic extract has for some time been prepared from this oil and other perfumes, which was known under the name of *aqua reginæ Hungariæ*. This preparation had its origin in Lesina. Besides rosemary oil, the dried leaves of this plant are sent into commerce as spices, and for use in the smoking of meat, and for the preparation of rosemary wine and rosemary vinegar.—Dingl. Polyt. Jour., 229, p. 466; in J. Chem. Soc., January, 1878, p. 97.

Oil of Bitter Almonds—Solvent Action on Iodine.—Dr. E. T. Blackwell has observed that oil of bitter almonds will take up as high as one-third of its weight of iodine and retain the same in solution. On placing together powdered iodine and oil of bitter almonds, the violet color of the former is immediately, and with great intensity, imparted to the latter; and if they are allowed to remain in contact for a rather long period,—two months or more,—they unite in the proportion of one of iodine to three of the oil. This solution mixes freely with oils, fats, glycerin, alcohol, ether, and fluid extracts of vegetable matter, and is alone

a most eligible concentrated preparation. The author therefore proposes

Iodized oil of bitter almonds to be prepared as follows: R Pulv. iodinii, ℥j; ol. amygdalæ amaræ, 3j (by weight). Mix and shake occasionally for two months.

With this preparation, iodized glycerin, iodized cod-liver oil, etc., may be prepared (see Glyceritæ and Misturæ in this Report).—Ph. J. Trans., November 2d, 1878, p. 349.

Oil of Bitter Almonds, Oil of Cherry Laurel—Detection of Nitrobenzol (Oil of Mirbane).—Dr. Enrico Pegna observes that the essential oils of almonds and of cherry laurel are not unfrequently found adulterated with oil of mirbane. To detect the latter, various methods have been pursued, but the author has found none that unite convenience as much with accuracy as does the following one proposed by him: The suspected oil is treated with a small quantity of alcohol and solution of potassic hydrate (purified by alcohol), and a few drops of ferric chloride are then mixed with it. The mixture is allowed to stand several hours, is then shaken and distilled. A portion of the oil collected in the receiver, after being deprived of water by suitable means, is then poured into a test-tube containing a few pieces of pure potassic hydrate, and heated over a lamp. If the oil is pure it remains colorless, because the hydruret of benzol is converted into benzoate of potassium and hydrogen. If it, to the contrary, contains nitrobenzol, a dark color is produced, owing to the formation of nitrobenzid; and since by this reaction a small quantity of anilin is also produced, a few drops of solution of chlorinated lime, poured upon the cooled mixture, acquire a violet color. In conducting this process, it is necessary to avoid all bumping and spirting, so that the distillate may not become contaminated with portions not properly belonging to it; it is to be observed also, that no portion of the oil is exposed to the direct flame during the distillation, which should proceed with the utmost regularity.—Schweiz. Wochenschr. f. Ph., November 15th, 1878, p. 399.

Cherry Laurel Oil.—Umney obtained from 112 kilograms of cherry laurel leaves 71 cc. of volatile oil by distillation. It was pale yellow, had a sp. gr. of 1.0615, an odor closely resembling that of volatile oil of almonds, and contained 2 per cent. of hydrocyanic acid. Crystals, probably of benzoic acid, were found floating in the recently distilled oil. When shaken with conc. solution

of bisulphite of sodium, an aldehyde-like body was separated, and only 1 to 2 per cent. of an oil containing a brown resin remained. The aldehyde-like body in association with the bisulphite was distilled with carbonate of sodium, and the aldehyde dried by chloride of calcium. It had a sp. gr. of 1.0492, and boiled at 174° – 178° C. ($=345.2^{\circ}$ – 352.4° F.). The resinous oily portion yielded by distillation with bichromate of potassium a liquid product, from which benzoic acid was deposited.—*Zeitschr. Est. Apoth. Ver.*, July 1st, 1878, p. 304; from *Jour. de Ph. et de Chim.*, 1878.

Oil of Valerian.—G. Bruylants contributes some researches on oil of valerian. When fresh it is slightly acid, and the color varies according to the kind of valerian used for its preparation; green when made from *Valeriana sylvestris*, and yellow when roots grown in marshy ground are employed in its manufacture. The fresh oil is without smell, but if left in contact with the air, it becomes resinous and acquires a fetid odor, owing to the formation of valeric acid. The oil also varies with the age of the root from which it is extracted; when prepared from old roots, it is much more acid and contains more resin than from fresh roots. It begins to boil at 120° C. ($=248^{\circ}$ F.), but the temperature rapidly rises to 160° C. ($=320^{\circ}$ F.), and then increases regularly until a temperature of about 350° C. ($=662^{\circ}$ F.) is reached. From freshly prepared oil about 5 per cent. of a blackish resinous matter, having a leathery odor, then remains in the retort. Six fractions, obtained at different boiling-points, were secured, but only two of these fractions were sufficiently pure to be examined. The experiments are, however, as yet incomplete, and are being continued.—*Ph. J. Trans.*, November 2d, 1878, p. 350.

Oil of Gaultheria Punctata.—H. Köhler describes this oil. It is a clear, rather thick oil, of brownish-yellow color, and possesses the well-known odor of wintergreen in a higher degree than the latter. It is indifferent to polarized light, and boils at 233° C. ($=451.4^{\circ}$ F.). It was found to consist of salicylate of methyl.

Oil of G. leucocarpa yielded the same results as the preceding.—*New Rem.*, June, 1879, pp. 177–8; from *Ber. d. d. Ch. Ges.*, 1879, p. 246.

Thymol—Liquefaction with Camphor.—In a paper by Mr. A. W. Gerrard (see *Proceedings*, 1878, p. 442), the pharmacy of

thymol has received very able attention. Mr. Charles Symes now contributes some further points. He found that when thymol and chloral hydrate were rubbed together, contrary to his expectation no liquefaction occurred; but if an equal quantity of camphor was then added, the whole at once liquefied. The compound proved to possess powerful antiseptic properties. Further experiments showed that thymol and camphor rubbed together alone would also produce a liquid similar to chloral camphor. It is colorless and syrupy when equal parts are used, and may serve a good purpose for preparing ointments of any desirable strength. The objection to the use of thymol alone, under certain conditions, have already been pointed out by Mr. Gerrard. Mr. Holmes furthermore has found milk to be an excellent aqueous solvent for thymol, it being capable of holding as much as 10 per cent. of its weight in solution. Glacial acetic acid is a good solvent, and acetic acid, B. P., will dissolve 2 grains to the fluid ounce. There appears to be some difference in the sp. gr. of thymol, arising probably from the source from whence derived; that described by Mr. Gerrard had a sp. gr. 1.028, whilst the specimens Mr. Symes had met with have only a sp. gr. of 0.980 to 0.990.—Ph. J. Trans., January 18th, 1879, p. 598.

Copaivic Acid.—Roquette has determined that neither the balsamic (?) nor volatile components of copaiva are its active principles, and that its activity is solely due to the acids contained in it. This observation has induced Professor Geza Lucich to undertake a series of experiments with a view to the isolation of copaivic acid in a pure condition, and in this he has succeeded by adopting the following method: The copaiva is distilled with water to remove the volatile oil, the residual resin, consisting of alpha (copaivic acid) and beta (soft) resin, is dissolved in purified rock oil (?), and by repeated solution in strong alcohol the copaivic acid is completely purified. The alpha resin, "copaivic acid," forms prismatic crystals, which soon become opaque when exposed to air. The acid forms the soda salt by the addition of 1 equivalent of soda. It constitutes a perfectly white crystalline powder, possessing all the properties attributed to it in textbooks, as obtained by the author. 2 parts of this compound are equal to 6 parts of copaiva. It is made into pills by mixing with one-half its weight of dextrin, and making the mass with mucilage. Professor Zlamál, who has used this compound, finds it to be medically very effective.—Ph. Centralh., October 3d, 1878, p. 374.

Amber—Microscopical Characters, etc.—O. Helm has continued his researches on amber (see Proceedings, 1878, p. 468). The clear yellow amber has no peculiar appearance when examined under the microscope, but if the opaque or white amber, cut into thin sections, be examined by a power of 220–500 diameters, round cavities, varying in size, are observed in the interior. The cavities in the milk-white amber are the smallest; in the opaque yellow sort they are larger, whilst in the less dense quality the cavities present the appearance of a mass of soap-bubbles. Water appears to be contained in the cavities, for if amber which has been laid in water for some time is exposed to an increased temperature the weight of the specimen diminishes, from which it would appear that moisture can diffuse through the substance of the amber, and the insects which are inclosed in the substance are perfectly dry, owing to this diffusion. This peculiarity is turned into account by the amber merchants, who, to clean the amber, soak the pieces in boiling oil, whereby the cavities contract and press out their contents, as water, lime, iron, etc. This process renders amber specifically heavier, transparent, and filled with innumerable small scalelike fissures.

Besides containing sulphur in the form of pyrites amber likewise contains sulphur combined organically, and to the amount of 0.26 per cent. in the clear yellow sort, 0.38 in the dark, 0.34 in the bone-colored, and 0.27 in the brownish-red weathered coating of the last-named kind. This sulphur is contained for the most part in the bitumen, which is insoluble in alcohol or ether. The author considers that the sulphur was introduced into the amber during the tertiary period, the origin being one of two, either the reduction of sulphates originally present in the interior, or that the sulphur has diffused itself into the resin from outside. In the first case the sulphate would be reduced to a sulphide, which in its turn would be transformed into an organic sulphide, and accompanied by the production of metallic carbonates. The evidence of the original appearance and structure of the amber still existing unaltered renders the above internal chemical change improbable. It is therefore more likely that sulphuretted hydrogen, or some other easily decomposable sulphide, has been formed in the neighborhood of the amber, and that this passing by diffusion into the interior then combines with the amber.—Arch. d. Phar. (3), 13, pp. 496–503; in J. Ch. Soc., April, 1878, p. 300.

Gedanite—A New Fossil Resin.—Up to the present time the substance known as “unripe amber” has been considered to be amber, but O. Helm shows that it differs totally from true amber in its composition, and has given it the name “gedanite.” Gedanite has a hardness of 1½–2, breaks easily, and has a sp. gr. of 1.058–1.068. It does not contain succinic acid, and when heated in oil it swells up and becomes like caoutchouc. Ether dissolves 40–52 per cent., and alcohol 18–25, and of the residue left by the evaporation of the alcohol ether dissolves 20–24 per cent. The portion soluble in alcohol softens at 100° C. (= 212° F.), and melts at 105° C. (= 221° F.), and then resembles mastic. The ash amounts to 0.06 per cent., and consists of lime, silica, sulphuric acid, and ferric oxide. Sulphur organically combined appears also to be present, and, like amber, gedanite is negatively electric. Its composition is C 81.01, H 11.41, O 7.33, S 0.25. Gedanite therefore differs from amber in having a lower melting-point, a smaller amount of oxygen, in being less hard, and more easily soluble in ether, and in the absence of succinic acid; and it differs from copal and other resins in containing sulphur organically combined, in having a higher melting-point, in being less soluble in various liquids, and in its amberlike odor when heated.—Arch. d. Phar. (3), 13, pp. 503–507; in J. Chem. Soc., April, 1879, p. 300.

Gum-resins—Purification—Eugene Dietrich has successfully purified gum-resins, such as *ammoniac* and *galbanum*, by the method proposed by Jungclaussen, which consists in dissolving the whole gum-resin in oil of turpentine over night, then adding alcohol, straining, and carefully distilling off the alcohol and oil of turpentine from the mixture, previously carefully decanted from sandy particles that may have passed through the strainer. The method, owing to the use of oil of turpentine, is, however, applicable only to such gum-resins as are to be used in the preparation of plasters, etc., and for this purpose the purified gum-resins are very superior, since they retain a much larger percentage of volatile oil than when they are purified by the usual method, i. e., freezing and powdering. Mr. Dietrich has therefore sought to do away with the oil of turpentine, and by the following modification of Jungclaussen's method has succeeded perfectly:

10 kilograms of the gum-resin are placed in an enamelled iron kettle, 2.5 liters of 90 per cent. alcohol are added, the mass is well kneaded, the kettle covered, and allowed to stand over night.

In the morning the mass is heated on a water-bath to, at the utmost, 40° C. ($= 104^{\circ}$ F.), and is worked with a wooden pestle for about three hours, or until a perfectly smooth paste is produced. It is then diluted with 2.5 liters of alcohol, and strained through a fine-meshed sieve, the portion remaining on the sieve being removed before a fresh quantity is added, and afterwards again triturated with 2.5 liters of alcohol, again thrown on the sieve, etc. The liquid that has passed through the sieve is decanted from any sand that may have passed, the latter is washed with fresh alcohol by decantation, and the whole of the decanted liquids are then evaporated at 50° C. ($= 122^{\circ}$ F.), with constant stirring, until all odor of alcohol has disappeared. The purified mass is then inclosed in the parchment-paper envelopes usually employed in the manufacture of the so-called pea sausage. The sieve and other vessels are cleansed with a brush and soda.

The following results were obtained by the author on applying his method to the gum-resins named, all being the best of their kind procurable :

10 *kilograms asafœtida*, in tears, yielded 65.4 per cent. purified gum-resin (16.5 per cent. residue on sieve, 11.2 per cent. sediment of sand, etc., 6.9 per cent. loss).

10 *kilograms ammoniac*, in tears, yielded 80.0 per cent. purified gum-resin (12.5 per cent. residue on sieve, 2.4 per cent. sediment of sand, etc., 5.1 per cent. loss).

10 *kilograms galbanum*, in grains, yielded 75.0 per cent. purified gum-resin (15.0 per cent. residue on sieve, 3.6 per cent. sediment of sand, etc., 6.4 per cent. loss).

In each case 10 liters of alcohol (90 per cent.) were consumed. —Ph. Centralh., January 16th, 1879, p. 18.

ALCOHOLS, ETHERS, ETC.

Alcohol—Detection and Approximate Determination of Minute Quantities.—Mr. J. C. Thresh communicates a new method for the detection of minute quantities of alcohol in certain liquids, which is dependent in its conversion into aldehyde, and the decided yellow color produced by the latter with caustic alkalies. The requisites to the test, which are both qualitative and quantitative, within certain limits, are: A saturated solution of bichromate of potash, a dilute sulphuric acid (B. P., acid and water, equal parts), a syrupy solution of caustic soda, methylated spirit free from al-

aldehyde, a 200 cc. flask with a condensing arrangement attached, and a long, narrow test-tube, graduated to 3 and 23 cc.

100 cc. of the diluted alcohol are placed in the flask; 2 cc. of bichromate solution, 8 cc. of the dilute acid, and a few pieces of pumice are added; 20 cc. are distilled (not too rapidly), and the distillate conveyed by a long tube to the bottom of the test-tube, in which has been previously placed 3 cc. of the soda solution. The liquid in the tube is then heated, kept at the boiling-point for a few seconds, and placed aside for a couple of hours. If 0.1 per cent. of alcohol was contained in the original solution, the contents of the test-tube will be of a deep-yellow color, and will have deposited flocks of aldehyde resin; with 0.05 per cent. no resin is formed, but the fluid is deep yellow, and perceptibly opalescent; with 0.01 per cent. the color is just perceptible, but the characteristic odor is still very distinct.

To make a more accurate determination, dilute 1 part of pure aldehyde with 200 parts of water, to this add 30 parts of caustic soda solution, and treat in the same way as the above distillate. After the lapse of two hours, dilute with 200 parts of warm methylated spirit, and add water to 500 parts. This solution is quite clear, and of a reddish-yellow color, and will keep for some time, especially if not exposed to the light. Mix 5 cc. of this solution with 45 cc. of water in a glass, such as is employed for nesslerizing, and take this as the standard solution. It does not keep more than two or three hours; hence fresh standards must be made from time to time, or a solution of bichromate of potash made of equal depth of color,—the tint being almost identical,—and kept for reference. To make the quantitative determination dilute the distillate with sufficient warm spirit to make a clear solution, and add water to 50 cc. Upon ascertaining the quantity of this solution which must be diluted with water to 50 cc. to bring the depth of color to that of the standard solution, the percentage of alcohol in the original solution is immediately known.

Having ascertained the reliability of the method where the alcohol was diluted with water only, the effect of the presence of other substances was tried by the author. Städeler has shown that albumen, fibrin, gelatin, and lactic acid yield a trace of aldehyde when treated with sulphuric acid and bichromate of potash, or peroxide of manganese; hence these compounds must be removed from the solution before the test is applied. No sub-

stances, with these exceptions, besides the ethyl compounds are known to yield aldehyde when thus treated. Various essential oils, chloroform, amyl alcohol, etc., were shaken with water, and the solution distilled with these oxidizing agents, but no yellow color was produced. The distillate from clove-water was pink, but when 0.1 per cent. of alcohol had been added, the pink tint was quite overpowered by the yellow color of the aldehyde resin produced. Ether, of course, yields aldehyde when oxidized, hence this test cannot serve to detect alcohol in ether. To detect alcohol in essential oils and chloroform, agitate the sample with an equal quantity of water, and when the aqueous solution has become clear, remove with a pipette and distil with bichromate and acid, etc.; 0.5 per cent can thus be easily detected quantitatively. The author gives some examples of volatile oils and chloroform, pure and admixed with small percentages of alcohol, which clearly show the availability of the method. By concentrating the fluids supposed to contain alcohol by one or more distillations, exceedingly minute traces can be detected by this process, especially if only one-tenth instead of one-fifth be distilled.—Ph. J. Trans., Nov. 16th, 1878, p. 409.

Alcohol—Rapid Determination.—It is sometimes inconvenient to determine the presence of alcohol by distillation, etc., and a ready method is desirable. Jacquemart states that if to a liquid suspected to contain alcohol a small quantity of solution of nitrate of mercury—obtained by dissolving metallic mercury in moderately strong nitric acid—is added, the reagent acts briskly upon the alcohol, various products are formed, and the mercuric compound is reduced to the condition of a mercurous compound. If, then, ammonia-water is added to the liquid a black precipitate is produced, the quantity of which is the more copious the larger the quantity of alcohol that is present. Methyl alcohol does not afford this black precipitate under any conditions. 5 to 6 cc. of the liquid to be tested are sufficient for the reaction. If colored, it must be decolorized by animal charcoal. If it contains volatile oils, or other substances sparingly soluble in water, these may be removed by the addition of some solution of common salt. If the alcohol is suspected in soaps, salves, etc., it may be washed out of them and taken up by water.—Ph. Centralh., November 7th, 1878, p. 425.

Alcohol—Limit of Separation.—The greatest degree of concen-

tration obtained by repeated rectifications, in the experience of J. A. Le Bel, was 96.5 per cent. On rectification over quicklime an alcohol of 98.5 was produced. When this spirit was subjected to fractional distillation the water passed over first, and the residue was the most highly alcoholic. After three rectifications the first portions marked 97.4, and the residue 99.3.—Compt. Rend., April 28th, 1879 ; in Chem. News, June 6th, 1879, p. 251.

Alcoholmetrical Table.—Mr. Alonzo Robbins furnishes the following table, showing the strength of certain commercial alcohols and of mixtures, by weight, of commercial 95 per cent. alcohol and distilled water, at 60° F., in different proportions. While the author does not present his table as entirely correct, he believes the figures given to be sufficiently correct for use in practical pharmacy, for which purpose alone the table was prepared.

	Percentage by volume.	Percentage by weight.	Specific gravity.
Absolute alcohol (commercial).....	99.60	99.19	.7962
Extra cologne spirit.....	94.75	92.03	.8170
Cologne spirit.....	93.75	91.02	.8199
95 per cent. alcohol.....	93.25	90.19	.8223
Neutral sweet spirit.....	41.50	34.80	.9494
95 per cent. alcohol, 10 parts. Water, 1 part.	87.00	82.07	.8433
" " " 9 " " " 1 "	85.75	80.58	.8469
" " " 8 " " " 1 "	85.50	80.26	.8477
" " " 7 " " " 1 "	84.00	78.53	.8521
" " " 6 " " " 1 "	82.75	76.94	.8559
" " " 5 " " " 1 "	81.50	75.38	.8595
" " " 4 " " " 1 "	78.25	71.43	.8685
" " " 3 " " " 1 "	74.00	66.80	.8798
" " " 2 " " " 1 "	67.50	59.90	.8959
" " " 1 " " " 1 "	52.00	44.50	.9303
" " " 2 " " " 3 "	43.00	36.10	.9469
" " " 1 " " " 2 "	36.00	29.90	.9579
" " " 1 " " " 3 "	27.00	22.17	.9689
" " " 1 " " " 4 "	23.00	18.77	.9731
" " " 1 " " " 5 "	19.00	15.43	.9772
" " " 1 " " " 6 "	17.00	13.78	.9791
" " " 1 " " " 7 "	15.00	12.13	.9814
" " " 1 " " " 8 "	13.00	10.50	.9834
" " " 1 " " " 9 "	12.00	9.68	.9844
" " " 1 " " " 10 "	10.00	8.05	.9869

The percentages by volume given in the table are too high in the ten lower items, but this error in most of them does not exceed one-fourth of one per cent., and in some is much less.—A. J. Ph., March, 1879, p. 113.

Beer and Wine—Hallymetric Determination of the Extract and Alcohol.—Dr. G. C. Wittstein draws attention to this method,*

* The "hallymetric" method is dependent on the solution by water of a constant quantity of common salt at the ordinary temperature. Fuchs found

originated by J. N. v. Fuchs in 1835 and 1836, for the rapid and correct determination of the extract and alcohol in beer. The author remarks that the younger generation of chemists in their search for new and improved methods frequently lose sight of old and well-tried methods; the hallymetric method of Fuchs being one that has stood the test of time, and is in every way correct and reliable. The author has, moreover, found that it is as applicable to wine as it is to beer, but owing to the greater alcoholic strength of wines the quantity of common salt used for the determination of the sum of extract and alcohol together (see note below) should be reduced; it should not exceed 300 grains for 1000 grains of the ordinary wines, and for the stronger, such as Marsela, sherry, etc., 280 to 290 grains are sufficient. For the determination of the extract by itself, of course, the directions as for beer, in which 350 grains to 1000 are used, will hold good. Dr. Wittstein has repeatedly confirmed the correctness of the hallymetric method, which requires only about 1 hour for execu-

that 100 parts of water were capable of dissolving 86 parts (all by weight) of common salt (1 part salt in 2 778 parts water). 1000 grains of beer will dissolve as much less as is represented by the weight of water corresponding to the alcohol and extract contained in it. If the beer is evaporated so as to drive off the alcohol, then brought with water to the original weight, the difference in the amount of salt actually dissolved, and that that would be dissolved by a corresponding quantity of water, indicates the quantity of extract contained in the beer. For instance, 360 grains of salt having been added to 1000 grains of beer treated as mentioned, 18 grains remain undissolved and 347 grains are dissolved. Consequently, the liquid contained $347 \times 2.778 = 964$ grains of water and 86 grains of extract, = 3.6 per cent. Supposing that the quantity of salt dissolved by the beer before evaporation corresponded to 923 grains of water, the quantity of alcohol and extract indicated would be 77 grains, deduct the extract, 86 grains, from this, and 41 grains or 4.1 per cent. remains for the alcohol. The carbonic acid in the beer can also be estimated, since it is given off on dissolving the salt in the beer, and facilitated by slight heat. The quantity of salt still remaining undissolved may be ascertained by weighing, but the result is equally correct by the use of the "hallymeter," the instrument designed by Fuchs for his method, and divided into degrees, each of which represents the space that 1 grain of common salt will occupy in the liquid when in fine powder and well shaken down. On this account it is necessary to use the salt in form of fine and uniform powder. The salt and liquid to be tested are well shaken together until all that will has dissolved, the greater part of the liquid is then poured off, the undissolved salt is carefully transferred to the hallymeter, and after shaking down thoroughly its quantity is read off.—REP.

tion, while the method now generally pursued—distillation and evaporation to dryness—consumes 5 to 6 hours.—Ph. Centralh., October 31st, 1878, p. 412.

Brewing in Japan.—Professor R. W. Atkinson has recently visited the *Saké breweries* at Hachiôji, about 30 miles from Tokio, to witness the curious process of fermentation pursued in Japan. *Saké* is the name given to the alcoholic liquid prepared by the fermentation of rice. There are many varieties of it prepared in different parts of Japan, each receiving some special name, either derived from the district in which it is prepared or from some fancy of the manufacturer. It is a clear liquid, of a color varying from the palest yellow to that of the darkest sherry, and containing from 12 to 15 per cent. by weight of alcohol. There are some special kinds which contain much less alcohol, from 4 to 5 per cent., but they do not form the usual drink of the Japanese. It is almost always served hot, being placed in porcelain bottles which are immersed in hot water, and left there until the whole has attained the proper temperature. The largest breweries are near Ozaka, but these being 400 miles from Tokio, the author selected one of the smaller breweries at Hachiôji for his inspection, which is described as follows:

The main room consists of a large wooden building, about 120 feet long by 50 feet broad, and 25 to 30 feet high, running along the middle of which, in the direction of its length, is a platform, about 12 feet from the ground, upon which some of the preliminary operations are carried out. Upon this a number of wooden tubs are placed, which serve for the preparation of the peculiar ferment, an operation which requires to be repeated several times during the brewing season, this being confined to winter, in order to prevent the action becoming tumultuous because of the comparatively high temperature of fermentation adopted. On the ground, ranged along the two sides of the building, are large tuns, used for the storing of the saké when made, and some of which are also used for the actual processes of fermentation.

The brewing commences with the preparation of the ferment. For this purpose, at the end of the previous brewing season, a quantity of a green mould is produced upon rice by exposing steamed rice mixed with a certain proportion of the ash of some tree, and over which the spores of this fungus have been scattered, in a well-closed chamber—which may be termed the “fungus chamber.” This is a small room about 7 feet high, 6 feet

broad, and 8 feet long, well lined, and covered with straw and matting, so that its temperature may be kept up for a considerable time. In this chamber the rice and spores are left for about 10 days, the atmosphere being kept quite moist by the vapor given off by the steamed rice, and at the end of that time the grains are found to be covered with a green fungus full of spores, and apparently the same kind as is found growing upon putrefying organic substances. The temperature of the chamber when examined was found to be 25° C. ($= 77^{\circ}$ F.), that of the external temperature being 13° C. ($= 55.4^{\circ}$ F.). This product is called *tané* (meaning *seed*), and is preserved from the end of the season to the next in bags, which are inclosed in wooden boxes between layers of a mixture of equal parts of lime and wood ashes. At the commencement of the season a quantity of steamed rice is placed on wooden trays in the "fungus chamber," but not mixed with wood ashes, and then "*tané*" is scattered over it, and the chamber kept closed for two to four days, when the rice grains are found to be covered with large quantities of fine hair-like threads—the mycelium of the fungus added. In this state it is called "*kōji*," which, if it were left longer in the "fungus chamber," would produce spores. This "*kōji*," or mycelium, the brewer uses for the preparation of yeast. For this purpose he mixes steamed rice with 30 per cent. of its weight of "*kōji*" and a sufficient quantity of water to make a thick mud in small shallow tubs, which are kept on the platform previously mentioned. In these it is frequently stirred and rubbed round with wooden tools, during a period of about ten days, in the course of which the grains of rice appear to be broken down, and the whole assumes a much thinner consistence, while at the same time the liquor becomes decidedly sweet—a result the progressive causes of which are not very clear. After the end of the ten days this product is mixed with fresh steamed rice, water, and "*kōji*," and introduced into larger wooden vessels, in which the mixture is heated by means of closed wooden tubs, containing hot water, and in order to prevent too rapid radiation the whole is covered with matting. The hot-water tubs are replaced day by day, so that the temperature may be kept up for eight to thirteen days; the average temperature appearing to be about 35° C. ($= 95^{\circ}$ F.). During this period there is a continuous development of gas, and a scum gradually forms upon the surface until it has a thickness of a little more than one inch, which, examined under the microscope, presents

the usual appearance of brewers' yeast—*saccharomyces*. At the end of this stage, if the operation has been well conducted, five tastes are distinguished: sweet, bitter, astringent, alcoholic, and sour, all of which are quite distinct, but the bitter, astringent, and sour are most marked. The product of this operation, which is called "moto" (meaning *source* or *origin*), is the ferment with which the *saké* is subsequently produced, all the previous steps being necessary to the formation of this yeast.

The actual fermentation is divided into three stages, called respectively beginning, middle, and end, the proportions of steamed rice and ferment varying slightly in each stage, but giving a final result of 100 parts of steamed rice to 30 parts of ferment. This mixture, together with the proper quantity of water, is placed in one of the large tuns and allowed to remain for about fifteen days in all, during which time fermentation actively proceeds and the liquid becomes strongly alcoholic. The liquid is then drawn off from the grains of rice, which have subsided, into another tun, where it is allowed to remain until the remainder of the rice has separated. The residue is subjected to expression in bags, the clear expressed liquid added to that previously decanted, and the whole transferred to boilers, in which it is heated to about 60° C. (= 140° F.), after which it is transferred to the store vats, and carefully sealed up.

There are in this process of brewing so many obscure points that Mr. Atkinson for the present refrains from endeavoring an explanation of the various phenomena involved. The process varies from the European method not only in the execution, but the conditions under which the ferment is produced, though not at present very intelligible, also differ very widely. It appears, indeed, to consist in the previous practical use of a discovery made by De Bary, and afterwards confirmed by Rees and Fitz, that alcoholic fermentation can be effected by the growth of a species of *Mucor*. It is remarkable, however, that while Fitz found in his experiments with *Mucor racemosus* that the presence of 4½ to 5 per cent. of alcohol killed the ferment, the ferment described is capable of producing a liquid containing 15 per cent. This is reconcilable only by the supposition that different species of *Mucor* may possess different degrees of sensitiveness to alcohol, and that the species used here may be less easily affected than the one employed by Fitz.—Ph. J. Trans., October 12th, 1878, p. 289; from Nature.

Beer—Production of a Bitter Principle under Certain Conditions.—H. W. Langbeck prepared two samples of a fermented liquor from solution of glucose with small quantities of tartar, tartaric acid, kino, and a few drops of a mixture of formic and ænanthic ether. Fermentation was set up by means of sound compressed yeast, and was maintained at a temperature of 18° to 20° C. (= 64.4° to 68° F.). One sample, filtered through flannel after four days and allowed to stand for three weeks in a stoppered cask at 8° C. (= 46.4° F.), yielded a pleasant vinous liquid. The second sample, not filtered till after five days, tasted intensely bitter, and grew worse on standing. The newly formed yeast, at first of a whitish-yellow, had taken a brownish color, died off, was precipitated by the more alcoholic character of the fluid, and formed with the alcohol in nascent state that substance which betrays itself by its bitterness in unhopped fermented liquors when the fermentation has been neglected. The compound in question is by no means innocuous. It was isolated by treating the liquor according to Dragendorff's methods, I and II. The author succeeded in obtaining it in a crystalline form, and described its reactions.—Correspondenzblatt der Ver. Anal. Chem., April 1st, 1871; in Chem. News, June 13th, 1879, p. 264.

Beer—Estimation of Sulphate of Calcium.—Mr. H. M. Wilson, having estimated sulphate of calcium in beer by the ordinary method usually employed, which is also recommended in the case of wine, obtained results which were lower than anticipated. The method consists in precipitating sulphuric acid in the direct way; by boiling a portion of the sample, adding hydrochloric acid and chloride of barium, etc. He subsequently obtained perfectly homogeneous results by the following modification of the process: 100 cc. of the sample were evaporated to dryness, after the addition of 0.5 gram of nitrate of potassium, and gently ignited over a Bunsen's flame. The resulting carbon was filtered off, and the now colorless filtrate strongly acidified with hydrochloric acid, boiled, and precipitated with chloride of barium. It would appear from this, that the organic matter in beer interferes with the precipitation of sulphuric acid.—Ch. News, October 18th, 1878, p. 197.

Whiskey—Alleged Presence of Copper.—A recent promulgation of the Government of Wurtemberg, Germany, requiring an examination of distilled spirits for copper, is evidently based upon the supposition that the latter is introduced by the copper still-

head and worms employed. A. Th. Starting, in whose locality all the parts of the stills and condensing worms are constructed of copper only, has examined the distilled spirits from eight different distilleries, and found them all to be free from copper. It is his opinion that the copper is introduced by unclean copper vessels used by dealers in measuring out the spirit. Arch. f. Ph.

Ether—Formation of a Hydrate.—C. Tanret has observed that when an ethereal solution is filtered in the open air, a snow-white substance forms upon that portion of the filter which is not covered by the solution. He has made a number of experiments with a view to determine the character of this snowlike substance, and has found it to consist of a hydrate of ether, in which water is probably contained in the proportion to form alcohol. The dry substance appears, indeed, to be a true chemical compound, like the compounds which Guthrie called kryohydrate. It reminds of the unstable crystallized hydrates of bisulphide of carbon, of hydrobromic acid, of chloride and bromide of methyl, hydrochloric acid, sulphurous acid, chlorine, and bromine.—Ph. Centralh., July 11th, 1878, p. 259.

Bromide of Ethyl—Preparation.—Dr. Wm. H. Greene draws attention to this compound, which has recently attracted some notice as an anæsthetic, superior, for various reasons, to either chloroform or ether. Prepared by the action of bromine on alcohol in the presence of amorphous phosphorus, it acquires a garlicky odor, which it is almost impossible to remove, and this process is therefore objectionable. The method of De Vrij—action of a mixture of strong sulphuric acid and alcohol on bromide of potassium—yields a product contaminated with ether, and the latter cannot be removed because their boiling-points are very near together (40° and 35° C. ($= 104^{\circ}$ and 95° F.)). This contamination is avoided if the sulphuric acid be dilute, and the following process gives satisfactory results, not only in the preparation of ethyl bromides, but also of the bromides from other alcohols:

12 p. of coarsely powdered potassium bromide and 11 p. of sulphuric acid diluted with its own volume of water, are heated in a retort or flask connected with a condenser; as soon as hydrobromic acid begins to be disengaged, 12 p. of alcohol are allowed to flow in slowly, as in the preparation of ether. Ethyl bromide distils over with a small quantity of water and some alcohol. The distillate is agitated with water to remove alcohol, the ethyl bromide separated and dried by potassium carbonate, which at the

same time neutralizes any free acid. It needs no further purification. About 8 p. of ethyl bromide should be obtained. It should be kept in a dark place.—A. J. Ph., June, 1879, p. 292.

Iodide of Ethyl—Preparation.—Louis Genois finds that it pays well to make this compound in preference to purchasing it. He finds that the following modification of a process published in "Lippincott's Encyclopædia of Chemistry" is safe, reliable, and speedy. The apparatus necessary are: a thin glass flask of the capacity of a pint; an adapter about six inches long, two inches wide at the larger, and about one inch wide at the smaller end; and a glass tube two feet long, bent at an angle of 45° , the short end being about eight inches long. One drachm of phosphorus and four ounces of alcohol are placed in the flask; two ounces of iodine mixed with about one ounce of broken glass are placed in the adapter, which is connected with the flask by means of a perforated cork or, preferably, rubber stopper; by means of another stopper the short end of the tube is fitted to the top of the adapter and the whole arrangement is connected with a Liebig's condenser and the heat of a water-bath applied. The phosphorus melts, and as the alcohol becomes heated, its vapor, ascending into the adapter, dissolves the iodine gradually; the solution trickles slowly down into the flask, where iodine and phosphorus react upon each other, forming an iodide of phosphorus, which, together with the alcohol, is decomposed, forming iodide of ethyl, phosphoric acid, and water. The process, to avoid an explosion, must of necessity be very slow, and whenever fumes of iodine or vapors of alcohol should rise too high in the tube, the heat is to be withdrawn, and replaced when the action has moderated; but when the iodine is all dissolved the heat is continued steadily in order to distil the ether, and it is well to use ice-water to condense it. The glass tube is attached between the adapter and condenser to obviate the suspension of the operation, thereby gaining time and avoiding a loss of ether. The distillate contains alcohol, of which it is deprived by washing with water, using a small quantity at a time; after which, it is sufficiently pure for medicinal use. When exposed to the light, iodide of ethyl is very prone to decompose, iodine being liberated. Bottles of orange or amber colored glass should be used to contain it. When made in the presence of an excess of phosphorus it keeps very well, but it is likely to contain some of it.—Drug. Circ., January, 1878, p. 28.

Sodium Ethylate (Caustic Alcohol).—In view of the interest taken in his introduction of ethylate of sodium into medical and surgical practice, Dr. Benjamin W. Richardson now contributes a brief essay on three points: historical, therapeutical, and pharmaceutical. The author brought the ethylates of sodium and potassium, with some other of the ethylate series, originally into notice for practical use so far back as 1870. He had found by experiment that in these ethylates he possessed bodies which, on being brought in contact with the moist living tissues, were decomposed, caustic alkali being produced by the extraction and decomposition of the water of the tissues. He therefore inferred that if an ethylate be applied to a vascular living tissue, he ought to get four results on application, viz. (a), a removal or absorption of water from the tissues into the ethylate; (b), the destructive action of a caustic from the caustic soda that would be formed; (c), coagulation from the alcohol that would be reproduced; (d), prevention of decomposition of the dead organic substance that would be formed. The first instance in which the ethylate of sodium was used gave all these results, and future experience has confirmed the principle. In order that the intention of the ethylates may be properly fulfilled they must be sent out by the pharmacist as absolute alcohols, and for that reason absolute ethylic alcohol must be used in their manufacture. If ethylate of sodium is to be sent out for use by pharmacists in the solid form, as suggested by Mr. Williams, he agrees with that gentleman that it had better be dispensed by the process of dissolving the solid ethylate in absolute alcohol. But the proportion which Mr. Williams suggests, one part of solid ethylate to two of alcohol, is under the mark; it would be better to take one to one and a half. The formula which the author communicated in the "Lancet" was intended to save the time of the busy dispenser, who might have only absolute alcohol and metallic sodium, and has given excellent results. It is as follows:

"Put half a fluid ounce of absolute alcohol (sp. gr. 0.795) into a two-ounce test-tube. Set the test-tube up in a bath of water at 50° F., and add, in small pieces at a time, cuttings of pure metallic sodium. A gas, hydrogen, will at once escape. Add the sodium until the gas ceases to escape, then raise the temperature of the water in the bath to 100° F., and add a little more sodium. When the gas again ceases to escape stop adding sodium; or if the fluid, which by this time will be of gelatinous consistency, should crys-

tallize, then stop. Afterwards cool down to 50° F., and add half a fluid ounce more of absolute alcohol."

This solution of ethylate of sodium is best dispensed in a bottle furnished with a glass stopper, ending in a pointed glass rod, which descends into the fluid. The fluid is best applied from the glass point, but may be applied very neatly with a clean quill, cut like a pen, and newly nibbed each time.—Ph. J. Trans., December 14th, 1878, p. 485.

Chloroform.—In recent years much has been written in favor of chloroform made from chloral. With a view to test the value of chloroform prepared from chloral as compared to that prepared by the ordinary method, Dr. Vulpius has therefore caused chloroform prepared by both methods, and obtained from six different sources, to be used in clinics at Heidelberg, each sample being numbered, so that the operators should be ignorant of the source. At the end of a month two kinds were reported as excellent, a third as inferior. The numbers being changed, the same two samples were again designated as superior. They proved to be chloroform made by the ordinary method. Both samples, however, when subjected rigorously to the sulphuric acid test failed to communicate the slightest color. The result proves that pure chloroform, prepared from alcohol with chlorinated lime, may, under circumstances, be superior to chloral chloroform, and that the latter is not likely to be superior to a pure article of the former.—Arch. f. Ph., July, 1878, p. 37.

Chloroform and Ether in Admixture.—Dr. W. H. Greene finds that when chloroform and ether are mixed together there is an elevation of temperature, and that the greatest heat is produced in equi-molecular proportion. 43 grams of ether at 20° C. (= 68° F.) being mixed with 60 grams of chloroform at the same temperature, the temperature of the mixture rises to 35° C. (= 95° F.). The ether should be anhydrous, otherwise the mixture will be turbid. There is but little contraction of volume, and it may be supposed that molecular combination takes place between the ether and chloroform. By fractional distillation the mixture may be separated into its constituents; begins to boil at 50° to 51° C. (= 122° to 123.8° F.), and several fractionings are necessary. Evaporated spontaneously the two components seem to pass into vapor together, and the composition of the mixture does not sensibly change. It burns with a smoky flame. The mixture, in

the above proportions, seems to be most suitable for anæsthetic purposes, and is preferred by Dr. Atlee to all other anæsthetics.—A. J. Ph., June, 1879, p. 291.

Iodoform—Solubilities.—The Germ. Pharm. states that iodoform is soluble in 20 p. of ether. Dr. Vulpius has made some experiments upon its solubilities, and finds it to be much more soluble, requiring but 6 parts of ether for solution. It is also more soluble in alcohol than is generally supposed, absolute alcohol taking up 4 per cent. of its weight. Anhydrous glycerin will take up about 1 per cent. at 212° F., but over one-half of the iodoform is again deposited on cooling. Fixed oils are better solvents, olive oil taking up by the aid of heat 20 per cent., and retaining 2 per cent. on cooling. In all probability cacao butter will retain the same amount in solution, an important point in connection with the preparation of suppositories.—Arch. f. Ph., March, 1879, p. 242.

Chloral Hydrate—Is it changed to Chloroform?—Liebreich, who discovered the soporific qualities of chloral, assumed that in the bloodvessels it was changed by the alkalies into chloroform. This has usually been accepted as the chemical explanation of its physiological action, but the theory has now been controverted by Tanret. He has shown that if a solution of chloral hydrate is mixed with an alkaline solution of permanganate of potassium, the liquid is decolorized and manganic oxide is precipitated. If the quantity employed be considerable and the temperature kept from rising above 104° F., the reaction is slow, and the filtered liquid will be found to contain chloride, carbonate, and formate of potassium. The gas evolved is carbonic oxide. Similar reaction can be effected in very dilute solutions, and takes place even with borax. It is therefore suggested by Mr. Tanret that chloral hydrate is decomposed in the blood conformably to his experiments, but that the carbonic oxide which is set free displaces oxygen, and effects are produced analogous to those observed in cases of poisoning by this gas.—Drug. Circ., May, 1879, p. 92.

Methylic Alcohol—Dangers of its Industrial Use.—L. Poincaré has observed that animals kept from eight to sixteen months in an atmosphere freely renewed, but charged with the vapor of methylic alcohol, presented during life an abnormal development of the abdomen. On a post-mortem examination the liver was found greatly enlarged and in a state of fatty degeneration. A similar

modification was traced in the muscular fibres of the heart, of the urinary passages, and of a great number of the pulmonary cells. There was also congestion of the nervous centres. The author urges that some other method of preparing alcohol (than methylating? Rep.) for industrial purposes should be selected.—Compt. Rend., November 4th, 1878; in Ch. News, November 29th, 1879, p. 264.

Sulphomethylate of Sodium.—Mr. Rabuteau has experimented with a new purgative, which is analogous to the sulphoethylate (sulphovinate) of sodium; differing from the latter only in containing methyl instead of ethyl. Sulphomethylate of barium is prepared in the same manner as sulphoethylate of barium. This is then decomposed by sulphuric acid, and the sulphomethylic acid thus liberated in solution is saturated with soda. It is said to be a very stable salt, and produces painless and copious stools in doses of about 15 grams ($= \frac{1}{2}$ ounce).—New Rem., May, 1879, p. 145; from La Ruche Pharm., 1879. No. 2.

Amylic Alcohol—Dextrogyratory Alcohol.—Mr. J. A. Le Bel finds that the rotatory power of commercial samples of amylic alcohol varies between -1° and -2° for 10 centimeters. He nevertheless found, however, that on the distillation of low residual liquids, containing butylic and propylic alcohols, boiling at 108° C. ($= 226.4^{\circ}$ F.) and 98° C. ($= 208.4^{\circ}$ F.), there is obtained as residue an amylic alcohol whose rotatory power is -3° and even above. As these alcohols have the same source as ordinary amylic alcohol, there is reason to admit that in the distillations of propylic and butylic alcohols the active amylic alcohol has been carried over in a larger proportion than its inactive isomer, whence it results that at a low temperature it must have a volatility much greater than the latter, and that the separation can be effected by distillation in a vacuum. By means of the action of moulds (*penicillium*) the author has decomposed inactive amylic alcohol, and has obtained a mixture very rich in dextrogyratory alcohol.—Compt. Rend., July 29th, 1878; in Chem. News, September 13th, 1878, p. 140.

Nitrite of Amyl.—Mr. D. B. Dott has examined commercial samples of nitrite of amyl, and has found them to vary very decidedly among each other, as well as from a sample carefully prepared by him (designated *a*). The author's experience leads him to the belief that nitrite of amyl having a definite constitution and boiling-point has not yet been obtained. This may be due

to the circumstance that amylic alcohol is a mixture of isomeric alcohols; but he is convinced that the process itself may be largely concerned in the variability of the products, since he finds a portion of the nitrite to be invariably decomposed during the rectification finally resorted to. The boiling-point of this ether is on that account, probably, given so variably by different authorities. The author has determined that fractions collected below 90° C. and above 100° C. are either physiologically inert or have an action distinct from nitrite of amyl. He therefore collected the fraction 90°–100° C. as correct, such portion having a specific gravity of 0.877. The results of the author's examinations are given as follows:

SAMPLE.	A.	B.	C.	D.	E.	F.
Specific gravity... ..	.877	.876	.864	.875	.875	.875
Below 90° C.....	5.0	3.0	34.6	2.6	0.0	52.0
90° to 100° C.....	85.0	65.0	6.7	47.5	11.5	33.3
Above 100° C.....	8.0	28.0	51.7	45.7	83.9	11.4
Water.....	0.0	0.0	1.8	0.0	2.2	0.0
Loss.....	2.0	4.0	5.2	4.2	2.4	3.3
	100.0	100.0	100.0	100.0	100.0	100.0

Of these samples the author considers *C* and *E* to be of very poor quality, *E* being, probably, inferior, because, although it apparently contains a larger percentage of amylic nitrite than *C*, it yields a large proportion, boiling over at 100° C.; the temperature rising to 230° C. before it was stopped, leaving a black, oily residue in the flask.—Yearbook of Pharm., 1878, pp. 500–503.

Nitrite of Amyl.—Referring to the paper of Mr. Dott, Dr. Wm. H. Greene endeavors to correct some erroneous ideas on the properties of amylic alcohol, obtained from fusel oil, and the nitrite derived from it. Theory indicates the existence of eight isomeric amylic alcohols, six of which are actually known. They are:

- (1.) *Normal primary amylic alcohol*: $\text{CH}_3\text{--CH}_2\text{--CH}_2\text{--CH}_2\text{OH}$.
- (2.) *Two normal secondary alcohols*: $\text{CH}_3\text{--CH}_2\text{--CH}_2\text{--CH(OH)--CH}_3$, methyl propylcarbinol.
- (3.) $\text{CH}_3\text{--CH}_2\text{--CH(OH)--CH}_2\text{--CH}_3$, diethylcarbinol.
- (4.) *Two primary isoamylic alcohols*: $\begin{smallmatrix} \text{CH}_3 \\ | \\ \text{CH}_2 \end{smallmatrix} > \text{CH--CH}_2\text{--CH}_2\text{OH}$, the ordinary alcohol of fusel oil.
- (5.) $\begin{smallmatrix} \text{CH}_3 \\ | \\ \text{CH}_2 \end{smallmatrix} \text{OH} > \text{CH--CH}_2\text{--CH}_2$, unknown.

(6.) One secondary isoamylic alcohol: $\begin{smallmatrix} \text{CH}_3 \\ | \\ \text{CH}_2 \end{smallmatrix} > \text{CH}-\text{CH.OH}-\text{CH}_3$, methyl-isopropylcarbinol.

(7.) One tertiary alcohol: $\begin{smallmatrix} \text{CH}_3 \\ | \\ \text{CH}_2 \end{smallmatrix} > \text{C.OH}-\text{CH}_2-\text{CH}_3$, ethyl-dimethylcarbinol.

(8.) One primary alcohol: $\begin{smallmatrix} \text{CH}_3 \\ | \\ \text{CH}_2 \end{smallmatrix} > \text{C} < \begin{smallmatrix} \text{CH}_3 \\ | \\ \text{CH}_2 \end{smallmatrix} \text{OH}$, unknown.

The constitution of the amylic alcohol of fermentation is represented by (4). This, when carefully separated from fusel oil by fractional distillation, boils constantly at 132° C. Portions may be obtained which, when fractioned in an imperfect apparatus, may pass entirely at 128° to 129° C.,* but if these be subjected to several careful rectifications in a suitable fractioning apparatus, they may be entirely resolved into the alcohol, boiling at 132° C., and into *isobutylic alcohol*, boiling at 109° C.

In the fusel oil of commerce two amylic alcohols exist, one of which is levogyrate and the other inactive or a mixture of levogyrate and dextrogyrate alcohols, almost impossible to separate, for their boiling-points are very nearly the same. By converting the mixture into amylsulphuric acid the two acids may be separated by the different solubilities of their barium salts. The valerianic acids of the two alcohols also differ, in that the acid from the active alcohol yields quinia salts, which refuse to crystallize, while that from the inactive alcohol yields a salt which crystallizes readily. Nevertheless, the author does not believe that the difference in purity of different samples of nitrite of amyl is due to the mixture of the two alcohols, for the boiling-points of the two isomeric nitrites would not be widely separated. He believes, to the contrary, that by whatever process nitrite of amyl be made, it is quite possible that its isomeride *nitropentane* may be formed at the same time; and this, having a boiling-point in the neighborhood of 160° C., would raise the boiling-point in proportion to its presence. He is of the opinion that perfectly pure nitrite of amyl can be obtained by many and careful fractionings, but that this would be too expensive for pharmaceutical use; and he contends that the pure nitrite of amyl boils constantly at 96° C.,—the boiling-point given by Balard,—and that its vapor is not dissociated at its boiling-point.†

* Mr. Dott states that an amylic alcohol, or mixture of alcohol having a constant boiling-point at 128° to 129° C., can be obtained by fractionating, and that such has a specific gravity of .877.

† Mr. Dott found that when he subjected a portion of nitrite of amyl, having

The author considers the amylic alcohol which passes after two or three fractionations between 128° and 132° C. to be sufficiently pure for all pharmaceutical purposes, and should the nitrite of amyl made from it be of poor quality, a faulty process, or carelessness in the rectification must be the cause. A very fair yield of nitrite of amyl may be obtained by the action of potassium nitrite and sulphuric acid on the alcohol. The nitrite distils very regularly; it is washed with a solution of potassium carbonate, dried with solid potassium carbonate, and distilled, all that passes below 100° C. being retained. Commercial samples from reputable houses examined by the author were found to have boiling-points varying from 70° to 180° C., evidencing that these products had never been rectified. Small quantities of nitrate of amyl were also found in commercial samples.—A. J. Ph., February, 1879, p. 65.

Amylen—Preparation.—According to the observations of several Russian chemists, commercial amylen is composed of four isomeric hydrocarbons: two soluble in dilute sulphuric acid (ethylmethylethylen and trimethylethylen), and two insoluble in that liquid (isopropylethylen and normal amylen). These are said to be distinguished by their boiling-points, but A. Etard regards this distinction as very unsatisfactory, since it is very difficult to obtain an amylen of constant boiling-point. The amylic alcohol of fermentation is composed of active amylic alcohol (ethylmethylethylic alcohol) and of inactive amylic alcohol (isopropylethylic alcohol). The author endeavored to modify the usual process,—digestion with chloride of zinc,—so as to avoid the formation of polymerous compounds as much as possible. For this purpose 500 grams of chloride of zinc were melted in a

its boiling-point at 90° to 100° C., to repeated distillations, the yield of nitrite boiling within these limits of temperature became constantly reduced, and *showed acid reaction although originally neutral*. Upon this circumstance he based his belief that the diminution in nitrite boiling at 90° to 100° C. was owing to decomposition. Dr. Greene observes, in reference to this, that, as can be demonstrated by the most rigorous experiment, no gas of any description is evolved during the distillation of nitrite of amyl, and that there can, therefore, be no decomposition. A range of ten degrees is very considerable, and a diminution of 5 or 6 per cent. of the portion passing between 90° and 100° C. at each fractionation is what might naturally be expected. The residues boiling above 100° , remaining after each fractionation, should have indicated to Mr. Dott that the nitrite was gradually approaching purity.

capacious retort of glass or metal, and a thin stream of amylic alcohol was allowed to flow in. The mixture froths somewhat towards the end of the reaction. The vapors, which are given off with great rapidity, are condensed by the aid of a very long cooling-tube. The distillate was dried with carbonate of potassium, and upon rectification yielded pure amylen, boiling at 35° to 38° C. ($= 95^{\circ}$ to 100.4° F.). It is completely absorbed by bromine with formation of bibrom-amylen, which has a constant boiling-point, and is not decomposed by boiling in a partial vacuum. It is completely free from butylen and propylen, contains only 3 to 4 per cent. of isopropylethylen, and may be freed from the latter by agitating it with sulphuric acid diluted with one-half its volume of water. When shaken with solution of iodhydric acid, saturated at 0° C. ($= 32^{\circ}$ F.), the amylen is converted into the iodhydrate, which boils constantly at 125° C. ($= 257^{\circ}$ F.).—Schweiz. Wochenschr. f. Ph., July 19th, 1878, p. 253.

Carbolic Acid—Explanation regarding the Red Color of otherwise Pure Acid.—The complaints here and there made of the red color assumed by carbolic acid, of otherwise guaranteed purity, has induced Gehe & Co., of Leipzig, to communicate some explanation in regard to the cause of this red color, though the subject of investigation both by prominent experimental chemists and manufacturers, has not yet been satisfactorily determined. It is a remarkable fact that of carbolic acid of the same lot, distilled at the same time, and under the same conditions apparently, one portion will remain perfectly white, while the other may become red. The view held by some chemists that the red color of carbolic acid is an evidence of great purity, is not supported by sufficient evidence, but, on the other hand, the assumption of a red color is not evidence of inferior quality. It is incidentally mentioned, also, that while the Pharm. Germ. gives the melting-point of pure carbolic acid at 25° to 30° C. ($= 77^{\circ}$ to 86° F.), it is generally much higher.—Ph. Centralh., November 28th, 1878, p. 454.

Carbolic Acid—Volumetric Determination.—Degener proposes the following method: The liquid containing phenol, free from sulphurous acid, is treated with aqueous solution of bromine of known strength as long as tribromphenol is precipitated. The end of the reaction is recognized by introducing a strip of iodide of potassium starch-paper, the iodine of which is liberated by

bromine. Any excess of bromine may be titrated back by a solution of phenol of known strength.—Ph. Centralh., October 31st, 1878, p. 411.

Carbolic Acid—New Test.—Dr. Edmund W. Davy had found a solution of molybdic acid in strong sulphuric acid to be a delicate test for ethyl alcohol (see Proceedings, 1878, p. 475). He now finds this reagent to be equally applicable to the detection of carbolic acid. When a drop or two of dilute aqueous solution of carbolic acid is brought in contact with a few drops of the molybdic solution, a light-yellow or yellowish-brown tint is immediately produced, which, passing to a maroon or reddish-brown, soon develops a beautiful purple coloration, and this remains without change for a considerable time. The reaction is favored by a gentle heat, but this should be limited to 120° or 130° F. It is best produced on a porcelain surface, preferably a small capsule with a handle to facilitate the heating. The solution of carbolic acid should be dilute, but only 1 or 2 drops of this to 3 or 4 drops of the reagent should be employed, for if more is used the reagent is too much diluted, and the reaction does not take place. If the carbolic acid itself is employed, and not its aqueous solution, a dark-olive, quickly changing to a very deep-blue, but no purple coloration, will be developed. The test is one of great delicacy, for the author has found that one small drop of an aqueous solution of carbolic acid, containing a thousandth of its weight of that acid, and only absolutely about the one-seventy-thousandth part of a grain, when mixed with three or four drops of the molybdic solution, produced immediately the yellowish-brown effect, which, after a few minutes, passed into a very distinct and beautiful purple coloration, and the color remained quite perceptible for four days. This, however, is the limit of its delicacy, in which it is only surpassed by the bromine test of Dr. Landolt, which depends on the circumstance that when an aqueous solution of bromine is brought in contact with carbolic acid there is immediately formed a sparingly soluble substance—tribromophenol. The reaction possesses the further advantage that it is not affected by the presence of a number of organic substances, and particularly that it may be used for the

Detection of Carbolic Acid in Creasote.—If an aqueous solution of creasote be subjected to the test, a brown or reddish-brown reaction is obtained, which, on standing or warming slightly, be-

comes fainter, passing to light yellowish-brown; in the case of pure carbolic acid solution, the purple color is developed, while if it is present to any considerable extent in the creasote, on standing or application of gentle heat, it passes to reddish-brown or to a maroon. The reaction may be made available for detecting as small a quantity even as one per cent. of carbolic acid in creasote. From 5 to 10 drops of the suspected creasote are shaken with half an ounce of distilled water, whereby all the carbolic acid present and some of the creasote are dissolved; the filtered aqueous solution is placed into a little flask furnished with a small glass tube, bent at a right angle, about twelve inches long. Heat being applied, the liquid begins to distil, and is condensed by the tube. The first drops collected will evidence creasote, while the later portions will evidence carbolic acid, if present.—*Chemical News*, October 18th, 1878, pp. 195–197.

Creasote—Distinctive Tests from Carbolic Acid and Cresylic Acid.—In an elaborate paper, read before the British Pharm. Conference, Mr. Alfred H. Allen gives the result of comprehensive experiments made to determine the value of the various tests that have been proposed, from time to time, for the distinction of carbolic acid, cresylic acid, and creasote. He finds that the three substances can readily be identified and distinguished from each other by the tests given as long as they are in their isolated condition. But when they are in admixture together, the case is quite different, and many of the tests given are either very much reduced in value or even absolutely worthless. As the problem is to detect the coal-tar acids in presence of wood-creasote, rather than the reverse, only affirmative tests for the former are of service, and in many cases these are seriously modified by the simultaneous presence of creasote. It appears, also, not to have been observed that cresylic acid, so largely present in the commoner kinds of carbolic acid, resembles creasote more closely than pure carbolic acid does, and fails altogether to respond to some of the tests which have been proposed to distinguish carbolic acid from creasote; and, inasmuch as wood creasote is most liable to be adulterated with common carbolic acid, the presence of cresylic acid in it cannot rightly be ignored. For the details of Mr. Allen's experiments the original paper must be referred to, but his conclusions may find place here. The only marked differences which the author has been able to observe between Morson's creasote (taken to be pure wood-creasote) and a mix-

ture of equal measures of that liquid and Calvert's No. 5 carbolic acid (a crude acid containing much cresylic) are the following: When shaken with twice its bulk of 9 per cent. soda solution pure creasote is dissolved and remains in solution when the solvent is increased to three volumes. The *mixture* was insoluble in either two, three, or four times its volume of 9 per cent. soda. This anomalous result proved to be due to the presence of water, which reduced the strength of the soda solution. When the water was previously expelled by boiling from the mixture of crude carbolic acid and creasote, solution took place with two volumes of soda.

When shaken with Price's glycerin (sp. gr. 1.258) pure creasote remained undissolved, though the proportion was varied from one to three volumes. The *mixture* dissolved readily and completely in an equal volume of glycerin. The liquid was not affected by a drop or two of water, but a further addition caused precipitation. A mixture containing 25 per cent. of creasote, when shaken with an equal measure of glycerin, was not precipitated by less than one and a quarter volume of water.

Shaken with half its volume of collodion (B. P.) pure creasote dissolved to a clear liquid. The *mixture* showed decided signs of precipitation when the liquid was allowed to run gently from one end of the tube to the other. With a mixture of two volumes of Calvert's No. 5 acid to one of creasote the precipitation of the nitro-cellulose was very marked.

As carbolic acid, cresylic acid, and creasote boil at temperatures tolerably wide apart, the author considered it possible to effect a sufficient separation by fractional distillation to enable the tests for the coal-tar acids to be more readily applied. It was found that carbolic acid could thus be fairly detected with glycerin and collodion. Whether or not cresylic acid can be thus detected the author does not mention.—Yearbook of Pharm., 1878, p. 575.

Glycerin—Its Early Manufacture in the United States.—Mr. Robert Shoemaker has communicated a very interesting contribution to the history of glycerin manufacture in this country. In 1846, or thereabouts, the late Professor Wm. Procter, Jr., visited Mr. Shoemaker's establishment with a view to acquainting himself with Mr. S.'s method of making lead plaster. Noticing the wash-water, containing glycerin, running to waste, he requested

Mr. S. to make for him a small quantity, which he desired as a specimen for his class. Accordingly, about 5 gallons of the wash-water was concentrated to a thin syrup, treated with sulphhydric acid, filtered, and the glycerin thus purified. Mr. Shoemaker is of the opinion that the glycerin thus prepared by him was the first ever seen in this country, and it certainly was the first ever prepared here. About 1848 some demand was created for glycerin, and Mr. Shoemaker proceeded to utilize the waste waters for its production, until finally the lead plaster became the waste product, since it became necessary to make the plaster for the glycerin alone. The price at first was \$4.00 per lb.; in 1849 it was reduced to \$3.00, and remained at that price until 1850, when it fell to \$2.75. About this time Price's glycerin began to be imported at a less price than Mr. Shoemaker could produce it, and he therefore gradually ceased to make it.—A. J. Ph., June, 1879, pp. 289–291.

Glycerin—Asserted Volatility.—In his paper on “Fluid Extracts by Repercolation” (A. J. Ph., May, 1878), Dr Squibb made the statement that on evaporating a mixture of glycerin, alcohol and water, containing 20 per cent. of glycerin, to a constant weight, only 16 per cent. of residue was obtained, showing that 20 per cent. of the glycerin in the mixture had been carried off with the vapor of the alcohol and water. The result being so much at variance with the recognized non-volatile character of glycerin, Mr. N. W. Lord made a series of appropriate experiments, the careful execution of which seems to leave no doubt that Dr. Squibb's results must have been due to some cause other than the volatility of glycerin in the presence of alcohol, and at atmospheric pressure. Mr. Lord, indeed, invariably obtained a slight excess of glycerin, a result which he attributes to the rapid evaporation of the alcohol during the mixing and weighing, thus concentrating the solution of glycerin. The glycerin used, when heated by itself for 30 minutes on a water-bath, showed no appreciable loss of weight.

Glycerin 16.7 per cent. and water 83.3 per cent. gave under the same treatment residues weighing 16.5 and 16.5 per cent.—A. J. Ph., August, 1878, p. 377.

Glycerin—New Test.—Iles's discovery that glycerin appears to act like an acid upon borates, liberating the boracic acid, which

may then be infallibly recognized by the flame test, suggested to A. Senier and A. J. G. Lowe that the test may be reversed, and used for the detection of glycerin. This is accomplished in the following manner: The aqueous solution to be examined is first made slightly *alkaline* with dilute soda solution, and a borax bead is dipped into it. The bead is allowed to rest for a minute or so, to allow solution to take place on its surface. Then it is held in a Bunsen flame, and if glycerin is present, it will show the characteristic color distinctly. Erythrite and glycol, as well as ammonium salts, giving the same reaction as with glycerin, must be absent. The latter are best removed by evaporating the liquid to near dryness, adding saturated solution of carbonate of sodium, and heating on a water-bath until no more ammoniacal vapors are given off. The residue is then exhausted with absolute alcohol, and tested in the above manner. Indeed, in all cases, it is best to exhaust the substance, or the residue left on its evaporation with absolute alcohol, and to apply the test to the residue left by the latter.—*New Rem.*, November, 1878, p. 339; from *J. Chem. Soc.*, 1878, p. 438.

Nitroglycerin—New Blasting Compound.—A. Nobel, the discoverer of dynamite, has recently announced another explosive compound, which is even more powerful than dynamite, and being impervious to water, possesses decided advantages over the latter. The compound, which he names “explosive gelatin” (*sprengleim*), has the appearance of ordinary gelatin, and is composed of 94–95 per cent. of nitroglycerin, and 5–6 per cent. of collodium. It is tough, but may be readily cut with a knife or scissors, and may in the cut-up condition be introduced into cartridges, shells, etc. It is caused to explode in the same manner as dynamite. The latter, as is well known, is easily affected by water, the nitroglycerin being separated from the absorbing substance. Explosive gelatin is said to be 50 per cent. more powerful than dynamite.—*Ph. Centralh.*, July 18th, 1878, p. 271.

FIXED OILS.

Apparatus for the Extraction of Fats.—B. Tollens describes an improved form of an apparatus for the continuous extraction of fats, or other substances which are dissolved by volatile menstrua. Into a glass tube, *a*, $1\frac{1}{4}$ inches wide and 12 inches long, drawn out

at the lower end, as shown in the cut (Fig. 51), a bent piece of glass rod is introduced, and upon the latter is placed a narrower and shorter glass tube, the lower orifice of which is tied with filtering-paper, and which is intended to receive the substance to be exhausted. The upper orifice of the tube *a* is closed with the cork *c*, bearing a glass tube, which is connected with an upright condenser (not shown in the cut). The lower elongated end of the tube *a* passes through a cork into the small flask, which is charged with ether (or another menstruum) to about $\frac{1}{3}$ of its capacity. As soon as the ether begins to boil, on the application of heat, the vapors pass upwards through the tube, heat the inner tube, and reach the condenser, whence they are returned in the shape of liquid, which drops upon the substance and runs saturated into the flask below. The heat is to be so adjusted that there is a constant layer of menstruum, about $\frac{1}{2}$ inch high, over the substance to be extracted.—*New Rem.*, November, 1878, p. 335; from *Zeitsch. f. Anal. Ch.*, 1878, p. 320.

FIG. 51.

Apparatus for Extracting Fats.

Fats—Apparatus for Determining the Specific Gravity.—Dr. E. Königs has sent a communication to the "*Pharmaceutische Zeitung*" (1879, No. 4), in which he advocates the determination of the specific gravity of fats obtained from butter as a criterion of their origin. He does not deny the accuracy, within certain limits, of Angell and Hehner's method, based on the percentage of fatty acids obtainable, but he claims at least an equal accuracy for his own method if carefully executed. He proposes to determine the specific gravity at the temperature of 100° C ($= 212^{\circ}$ F.), by means of small, carefully made standard hydrometers. For the rapid performance of the examination he uses the apparatus illustrated by Fig. 52, which may also be used for other purposes. *C* and *B* are two water-baths, the covers of which (see *E*) are perforated with holes for the introduction of test-tubes. *A* is an inverted bottle serving as a reservoir of water, for the automatic supply of water to the water-baths. The bottle *A* is closed with a stopper, through which a glass tube passes, which reaches

to about the centre of the vessel *D*, which may be an ordinary lamp chimney, closed at its smaller end with a cork, bearing two glass tubes connected with the water-baths. *O* represents the level of the water in the chimney, and, owing to its connection, also in the water-baths. When using the apparatus, the water

FIG. 82.

Apparatus for Examining Fats.

in both baths must be kept briskly boiling. For purposes of comparison, three test-tubes, containing respectively tallow, artificial butter, and natural butter of known origin, are always examined in connection with each fresh sample of fat. Dr. Königs found the specific gravity of natural butter at 100° C. (= 212° F.) to vary between 0.865 and 0.868, and to be mostly 0.867. Artificial butter was found to have a sp. gr. 0.859; tallow, 0.860; suet, 0.860; lard, 0.861; horse-fat, 0.861. Mixtures of natural butter with foreign fats showed specific gravities varying between 0.859 and 0.865 at the temperature above named.—New Rem., June, 1879, p. 164.

Specific Gravity of Solid Fats, Resins, Balsams, etc.—Dr. Hager draws attention to a simple method of determining the sp. gr. of solid fats, etc., which seems calculated to give greater popularity

to the taking of the sp. gr. of such substances, which present many difficulties as ordinarily conducted. The method depends on floating the carefully prepared substance in liquids composed of mixtures of water and alcohol or glycerin, and then ascertaining the sp. gr. of such liquid. The following directions are given: 3 to 5 grams of the substance are melted in a small capsule with a lip, at a temperature not exceeding that of the water-bath, the lip being slightly warmed, and the melted mass is then dropped at a height not exceeding 2 to 3 ctm. upon the surface of alcohol of 60 to 90 per cent. (if soluble in alcohol, diluted alcohol must be used) contained in a glass vessel, with perfectly level bottom, to the height of 1.5 to 2 ctm. Each drop is allowed to fall into the liquid at a different point, and 20 drops will suffice.* Tallow, butter, lard congeal on the bottom in the form of perfectly round globules; cacao fat semiglobular; wax and paraffin also do not congeal in perfectly regular form. The congealed drops are then transferred by means of a small spoon into the liquid in which they are to float. This liquid, according to whether it shall be lighter or heavier than water, is composed of water and alcohol or water and glycerin. It is recommended that whenever it is possible water should never be added to alcohol or to glycerin to bring these liquids to the proper gravity, but instead alcohol diluted with water, or diluted glycerin, as the case may be. The mixture also should be effected by gentle motion, to avoid the formation of air-bubbles. The vessel in which the test is made should be 6 to 7 ctm. high, by about 4 ctm. diameter, and cylindrical. The liquid to reduce or raise the sp. gr. is then carefully added until the body begins to rotate, in the same plane with the liquid when the latter is gently rotated, and when it does not show a tendency to assume a spiral direction either towards the surface or towards the bottom; when in fact it shows a tendency to float, and does not rise or sink at once. The liquid is then filtered through a tuft of coarse cotton, and its sp. gr., which is also that of the substance, is determined by suitable means. In

* In the case of resins that have a melting-point above 90° C. (= 194° F.), the method of melting and dropping cannot be resorted to, for when heated over a flame they usually froth. It is therefore best to secure small and smooth fragments by a gentle blow upon the mass, and treating such fragments the same as the drops that have been produced by melting, etc.

this way Dr. Hager ascertained the specific gravities of the following substances:

SUBSTANCE.	SPECIFIC GRAVITY.
Butter fat (clarified),	0.938-0.940
Butter (several months old),	0.936-0.937
Artificial butter,	0.925-0.930
Artificial butter,	0.924-0.925
Lard (fresh),	0.931-0.932
Lard (old),	0.940-0.942
Beef tallow,	0.925-0.929
Mutton tallow,	0.937-0.940
Mutton and beef tallow, mixed in equal weights,	0.936-0.938
Cacao fat (fresh),	0.950-0.952
Cacao fat (very old),	0.945-0.946
Cacao fat and beef tallow, mixed in equal weights,	0.938-0.939
Fixed oil of nutmeg,	1.016-1.018
Fixed oil of nutmeg, extracted by CS_2 ,	1.014-1.015
Fixed oil of nutmeg, adulterated with fatty acid,	1.010-1.011
Fixed oil of nutmeg (crystallizable),	0.965-0.966
Stearic acid (melted and dropped),	0.964
Stearic acid (crystallized),	0.967-0.969
Wax, yellow,	0.959-0.962
Wax, African,	0.960
Yellow wax and resin, in equal parts,	0.973-0.976
Yellow wax and paraffin, in equal parts,	0.916-0.919
Yellow wax 66, and yellow ceresin 33, mixed,	0.942-0.943
Ceresin, yellow,	0.925-0.928
Wax, Japanese,	0.977-0.978
Wax, Japanese (very old),	0.968-0.970
Wax, white (very old), before paraffin and stearin were found in the markets,	0.963-0.964
Wax, white (new),	0.919-0.925
White wax (new) and stearic acid, equal parts,	0.945
White wax (sp. gr. 0.963) and stearic acid (sp. gr. 0.963), mixed in equal parts,	0.975
Ceresin, very white and pure,	0.905-0.908
Ceresin, white,	0.923-0.924
Araucaria wax,	0.990
Pine resin, yellow and transparent,	1.083-1.084
Pine resin, white and opaque,	1.044-1.047
Colophonium, very dark,	1.100
Shellac, light,	1.113-1.114
Shellac, darker,	1.123
Shellac, bleached,	0.965-0.968
Dammar (old),	1.075
Copal, East Indian,	1.063-1.070
Copal, West Indian,	1.070-1.080
Copal (very old),	1.054-1.055
Benzoin, Siam,	1.235
Benzoin, Penang,	1.145-1.155
Benzoin, Borneo,	1.165-1.170
Gualac resin, pure,	1.236-1.237
Amber,	1.074-1.094
Mastic,	1.056-1.060
Tolu (old, brittle),	1.231-1.232
Kamala,	1.115-1.120
Lycopodium,	1.016-1.020
Sandarac,	1.038-1.044

In the above list a number of differences are observed that

enable identification of purity or adulteration with some certainty.—Ph. Centralh., March 27th, 1879, pp. 132–135.

Fats and Oils—Estimation of Mineral Oils or Paraffin in Admixture.—Mr. W. Thompson proposes for this purpose a method which consists in saponifying the oils with an alcoholic solution of caustic soda, and separating the unsaponified oil or paraffin with petroleum spirit. 200 p. of the oil are placed in a basin with 350 p. of an alcoholic solution of soda (containing 9 per cent. Na_2O), and boiled until the mixture begins to froth. 200 p. of methylated spirit are added to dissolve the soap, etc., 90 p. of bicarbonate of sodium to convert any caustic soda into carbonate, and finally 500 parts of washed and ignited mortar-sand. The mixture is boiled a few minutes, and then the alcohol and water are distilled off from a water-bath. The residue, when cold, is transferred to a wide-mouthed stoppered bottle, and shaken with petroleum spirit; the sand and soap are allowed to settle, the spirit containing the wax and mineral oil is drawn off and filtered through asbestos. The residue of sand and soap is thrown on a cloth, and the liquid expressed. The petroleum spirit is distilled from the mineral oil at 100° (F.), and the residue is transferred to a flask, with a hole blown in the side, which is fitted with a cork bearing a thermometer and a small piece of glass tubing; the whole is previously weighed, and the last traces of spirit are distilled at 220° (F.); dry air is then blown through, and the whole is weighed. Certain corrections have to be made in consequence of oil capable of saponification containing small quantities of oil which cannot be saponified, and which are soluble in petroleum spirit. The correction in the case of Russian tallow, for instance, amounts to 0.64 per cent.—New Rem., May, 1879, p. 145; from Ch. News, 1878.

Butter Analysis—Simplification of Hehner's Method.—E. Reichert operates as follows: 2.5 grams of the dehydrated fat are heated by the water-bath in a flask of 150 cc. capacity with 1.0 gram caustic potassa and 20 cc. of alcohol of 80 per cent., and agitated occasionally until frothing no longer takes place and saponification is complete. 50 cc. of water are then added, and when solution is effected this is followed by 20 cc. of diluted sulphuric acid (1 vol. conc. sulph. acid to 10 vols. of water). The contents are now carefully subjected to distillation, passing a faint current of air through the liquid to prevent bumping, and fitting

a ball-tube with a wide opening into the retort to prevent the spirting over of any of the sulphuric acid. After 10 to 20 cc. have thus been distilled over the distillate is returned to the retort, and the distillation is then continued until 50 cc. of *filtered* distillate have been collected. This is tinged with a drop of tincture of litmus, and titrated with $\frac{1}{10}$ th normal soda solution until the blue color of the litmus is permanent.

As the result of a large number of experiments thus made, the author finds that 13 to 14 cc. of $\frac{1}{10}$ th normal soda solution are required for the distillate obtained from pure butter fat. For other fats the following quantities were required: Cocoanut fat, 3.70 cc.; artificial butter, 0.95 cc.; lard, 0.30 cc.; kidney fat, 0.25 cc.; rape-seed oil, 0.25 cc.

The author has also made experiments with mixtures of butter with other fats, and finds that when 0.30 cc. is deducted from the number of cc. of $\frac{1}{10}$ th normal soda solution required, and the product is multiplied by 7.30, the probable percentage of real butter is ascertained.—Ph. Centralh., January 30th, 1879, p. 41.

Fats—Saponification (so-called) by Sulphuric Acid.—In 1836 E. Frémy had communicated his paper on the “Relation of Sulphuric Acid to Fixed Oils,” in which he showed that fats are by the action of concentrated sulphuric acid split into sulpho-glycerinic and sulpho-fatty acids, which, in their turn, on treatment with boiling water, yield glycerin and fatty acids. He had called this method *saponification by sulphuric acid*, and since then the method has been extensively applied in the industries. In his paper he had drawn attention to the fact that he had obtained with care and under certain conditions perfectly white fatty acids, but as applied by the manufacturer these products have hitherto always required distillation to render them perfectly white, the products of carbonization produced by the action of sulphuric acid upon the fats being difficult to remove by other means. That his views originally expressed were correct has been proved by the exhibits made at the recent Exposition in Paris, where perfectly white fat acids were displayed which, while made by the intervention of sulphuric acid, required no distillation for their final purification. Mr. Frémy states that he obtained the acids perfectly white—on the experimental scale—partly by previously purifying the fats, and partly by allowing the sulphuric acid to react slowly and carefully upon them, and this point seems to have been lost sight of by manufacturers until

in recent years.—*Zeitschr. Oest. Ap. Ver.*, December 1st, 1878, p. 544.

Fatty Acids—Determination.—E. Langier has communicated two methods for the estimation of free fatty acids in fixed oils. The first is dependent on the solubility of fatty acids in strong alcohol, and the insolubility of most of the fixed oils in that liquid—castor oil being the exception. The second method, which Dr. Hager considers to have some advantages over the ordinary methods employed, is as follows: Carbonate of sodium mixed with a certain quantity of the oil, and the mixture stirred occasionally for 5 to 6 hours. An equal or double the volume of a mixture of powdered pumice and talc is then stirred into the mixture, whereby a nearly dry mass is obtained, which is placed into a percolator and extracted with ether. On evaporating the ethereal solution, washing with water, and drying, the quantity of neutral oil is obtained which, deducted from the total quantity used, gives the quantity of fatty acid contained in it.

Dr. Hager observes that this method is open to some objections, and is somewhat troublesome. He proposes that a mixture of 5.0 dehydrated carbonate of sodium and 10.0 of the oil be triturated in a mortar, 5.0 water added, the mixture heated on a water-bath for an hour, then mixed with powdered pumice (medium fine) until a crumbling mass is produced, which is dried, treated with anhydrous ether as above, the ethereal solution evaporated to dryness, and weighed. The result is, however, only approximately correct, since there are mucilaginous, coloring, and resinous components in the fixed oil which, being insoluble in ether under the conditions of the analysis, may increase the percentage of fatty acids by two and even more per cent. For this reason he recommends the extraction of the residue remaining in the percolator after treatment with ether with alcohol, evaporating the solution of fatty acid compounds, decomposing with dilute sulphuric acid at 50° C. (= 122° F.), taking up the liberated acids by paraffin, and weighing. The increase in the weight of the paraffin gives the free fatty acids; the weight of these and of the neutral oil, deducted from 10.0, gives the substances that are not fatty acids or oil.—*Ph. Centralh.*, February 13th, 1879, p. 57.

Stearic and Oleic Acid—Method of Separation and Determination.—J. David bases a method of separation of these acids on the novel fact that if acetic acid is dropped into an alcoholic solu-

tion of oleic acid a moment arrives when the oleic acid separates suddenly. Thus, if at a temperature of 15° C. ($= 59^{\circ}$ F.) 1 cc. of oleic acid is dissolved in 3 cc. of alcohol at 95 per cent., and if into this liquor there is dropped a mixture of equal volumes of water and glacial acetic acid, the separation of oleic acid—which does not even begin on the addition of 2.2 cc. of the acetic acid—is completed by 2.3 cc. It is not the same with the alcoholic solution of stearic acid, which begins to precipitate on the addition of the first drop. Further, stearic acid, which is insoluble in a mixture of alcohol and acetic acid, is equally insoluble when the mixture contains oleic acid. The authors effect the separation of the two fatty acids as follows: They mix in a flask a liter of glacial acetic acid with a liter of water. Operating at 15° C. ($= 59^{\circ}$ F.) they pour into a small tube, graduated in tenths, 1 cc. of pure oleic acid, then 3 cc. of alcohol at 95 per cent., and, finally, 2.2 cc. of the acetic acid. So far nothing ought to be precipitated, but if on adding $\frac{1}{10}$ th cc. of acetic acid a turbidity appears, and if above the mixture of alcohol and acetic acid there floats 1 cc. of oleic acid, it may be inferred that the sample is good. If not, the proportions are varied until the point of precipitation is hit within 0.1 cc. of acetic acid. When this end is attained, alcohol and acetic acid are mixed in the proportions indicated by the preliminary trial—for instance, 300 of alcohol to 220 of acid. In the meantime they add to the alcoholic-acetic mixture 1 gram or 2 grams of stearic acid cut in fragments, and, finally, the lower end of the exit-tube of the washing-bottle is fitted with a small piece of sponge, so that when operating they may always have a clear liquid free from stearic acid. When not in use both apertures of the washing-bottle are kept well stoppered, in order to prevent the evaporation of the alcohol. The analysis is then performed as follows:

0.95 (gram?) of the fatty acid to be analyzed is weighed into a thin tube-flask fitted with a ground stopper. Upon it are poured 15 cc. of the alcoholic mixture; it is repeatedly shaken up, and left for 24 hours in a cellar of the maximum temperature of 15° C. ($= 59^{\circ}$ F.). The oleic acid being then entirely dissolved, the whole is thrown upon a small filter, in a funnel whose edges are ground and covered with a glass plate. The stearic acid remaining upon the filter is washed with the same mixture of alcohol and acetic acid with which the filter is filled three times in succession, thus rendering it perfectly free from oleic acid. The

stearic acid is then entirely washed from the filter into a tared platinum capsule by means of a stream of cold water from a washing-bottle with a very slender orifice. The capsule is then heated, and when the stearic acid has collected on the surface of the water as an oily cake it is allowed to cool. The water beneath is decanted off, and the stearic acid is completely dried at 100°C. ($= 212^{\circ}\text{F.}$), or better in a vacuum, and weighed.—*Compt. Rend.*, June 3d, 1878; in *Chem. News*, July 12th, 1878, p. 21.

Oleic Acid and Oleates.—Mr. L. Wolff finds that much of the so-called purified oleic acid of commerce is simply crude oleic acid deprived of its coloring matter by animal charcoal, and consists largely of stearic acid. By saponifying the crude acid and treatment with benzin, etc. (see *Proceedings*, 1878), a very satisfactory oleic acid may be obtained; but it is quite difficult to separate the stearate from the oleate, and hence he recommends the preparation of oleic acid from expressed oil of almonds. The oil is saponified with litharge after the manner of preparing lead plaster from olive oil, using a decided excess of litharge (one-half more) to insure complete saponification. The oleo-palmitate of lead so formed dissolves readily in benzin, and deposits the palmitate. The solution of oleate of lead being decanted it is shaken with dilute hydrochloric acid (1 to 7), and the solution of oleic acid subjected to evaporation to drive off the benzin obtained; in this way oleic acid produces oleates which remain liquid and clear, while those made from commercial acids, even when containing but 10 per cent. of mercuric oxide, are semisolid and turbid.

Oleic acid should be light yellow, readily miscible with alcohol of 92 per cent., in all proportions, without causing turbidity, should be free from lead, and should not congeal or become turbid on exposure to the freezing temperature of water.

Oleate of mercury, prepared with such oleic acid, has proved of decided value in ophthalmic practice. It is dispensed preferably diluted with petroleum ointment, and the author suggests the following formulas:

R. Hydrargyri oleatis, 10 per cent, 1 part.
Unguenti petrolei, 2 parts. M.

It corresponds to an ointment containing 2 grains of the oxide to the drachm.

R. Hydrargyri oleatis, 10 per cent., 1 part.
Unguenti petrolei, 5 parts. M.

Oleate of zinc, oleate of iron, and oleate of bismuth have also been prepared by the author, 1 part of oxide of zinc, oxide of bismuth or ferric oxide being dissolved by the aid of moderate heat in 8 parts of oleic acid, or, in the event that the ferrous compound is desired, reduced iron is treated with oleic acid in the presence of water. These oleates may then be suitably diluted.

Finally, the author draws attention to the probable applicability of oleic acid for the isolation of alkaloids, which is noted more fully under the head of "Alkaloids" in this report.—A. J. Ph., January, 1878, p. 8.

Piney Tallow—Composition.—G. dal Sie has examined two samples of this fat, the product of *Vateria Indica*, growing in Malabar, the one obtained from Venice, the other from Trieste, which differed somewhat in appearance, the one being more carefully prepared than the other. A careful examination, of which the details are given, showed that this substance consists of a mixture of 75 per cent. free palmitic acid, 22.8 per cent. free oleic acid, and small quantities of impurities, separable by filtration after fusion. Volatile acids or glycerin could not be detected. The crude fat may be bleached after filtration, by mixing it with an equal bulk of boiling water, adding 9 per cent. of nitric acid, and boiling a few minutes. In this way the greenish color of the original substance is changed to yellow, and a subsequent exposure to the sun and air, after the acid has been removed by washing with boiling water, easily completes the bleaching process.—Gazz. Chim. Ital., 8, pp. 107–119; in J. Chem. Soc., September, 1878, p. 764.

Shea Butter.—Mr. E. M. Holmes draws attention to this solid fat, obtained from the seeds of

Butyrospermum Parkii, a tree which was first discovered by Mungo Park in the Kingdom of Bambara, but has since been found abundantly in the Niger country, and also in the Nile land, Niammiam country, Madi, and at Bornou, in Central Africa. Further south, in the Gaboon and neighboring countries, two other species, *Bassia Djave* and *B. Nounjon*, yield a similar fat. Mungo Park states that the trees grow in great abundance all over that part of Bambara in which the town of Kabba is situated, and in clearing the woodland for cultivation, every tree is cut down except the Shea. The tree itself very much resembles the American oak. The fruit has somewhat the appearance of

a Spanish olive; the kernel, from which the butter is prepared by boiling in water after first drying, is surrounded by a sweet pulp under a thin green rind. It is almost the size of a pigeon's egg, and is ripe in May and June. Oliver describes the tree as attaining a height of 30 to 40 feet, with a trunk 10 feet high, and 5 or 6 feet in circumference, branching like an oak, and yielding on incision a copious milky juice. The branches present a somewhat bare appearance on account of the leaves being crowded together at the tips of the branches. The leaves are large and handsome, with wavy edges and parallel ribs. Captain Grant states that the wood is red, like cedar, and very hard and close-grained. The milk, which exudes when the bark is cut, becomes, when dry, a hard insoluble gum. The flowers appear in December, are of a creamy yellow, occur in thick clusters at the end of the branches, smell strongly of honey, and soon fall off. The bark of the tree, when growing near villages, being frequently much chipped off, it is supposed to be used medicinally. Mungo Park found Shea butter, also called Galam butter, to possess a richer flavor than the best cows' butter he ever tasted, and that it possessed the further advantage of keeping the whole year round without salt, and in being whiter and firmer. It forms an important article of commerce in Western Africa, from whence it is now largely exported to England (300 to 500 tons annually), and, on the authority of Mr. Shaw, of Liverpool, often passes under the name of palm oil. Both in England and in Belgium it appears to have come into use during the last twenty years in soap-making, being chiefly used to impart hardness to them. Mr. W. Henderson, of Glasgow, regards it as the least alterable fat with which he is acquainted, and that this unalterability is the more remarkable when it is considered that it comes from a hot country, and is treated in a way to induce it to become rancid. Palm oil from the same country is in a very rancid and decomposed state.

At common temperatures Shea butter is a dirty white solid, but when fresh it is said to have a grayish or greenish-white tint. Oudemans found it to yield about 70 per cent. stearic acid and 30 per cent. oleic acid, but no palmitic acid, and this composition is confirmed by Pfaff. It softens at 95° F., and melts at 109° F., but these melting-points have been differently stated. Mr. W. L. Carpenter, who states that it may be obtained perfectly white by filtration in a warm closet, believes that two kinds of Shea butter exist, which vary in their percentage of stearic acid,

since the melting-points of the two differ about 4°C. ($= 7.2^{\circ}\text{F.}$).

Gutta Shea.—Mr. Henderson has given this name to a peculiar substance present in Shea butter to the amount of one-half per cent. only, but which he considers necessary to remove from the butter intended for candle-making, since it burns with a very smoky flame. It can be removed from the fat by dissolving it in a mixture of three parts of ether and one of alcohol, when it separates in a filmy state, but more readily if the fat be first saponified. The gutta Shea is a hydrocarbon, soluble in oils and fats, and in strong nitric acid with oxidation, and the deposit of a little flocculent matter, but is insoluble in sulphuric acid, muriatic acid, and alkalies.—Ph. J. Trans., April 5th, 1879, p. 818.

Drying Oil.—A rapidly drying linseed oil is obtained, according to Heuman, if 2 liters of the oil are mixed with 5 grams manganic oxyhydrate, heated with stirring until it begins to give off faint vapors, and that temperature is then maintained for 15 to 30 minutes. The oil is then allowed to become clear, and decanted.—Ph. Centralh., February 6th, 1879, p. 66.

Castor Oil—Products of Distillation under Reduced Pressure.—F. Krafft finds that when castor oil is distilled under a very low pressure, there passes over first a colorless oily distillate equal to about one-third or one-half of the oil used, and then a small quantity of an oily liquid, whilst a slimy saponifiable mass remains in the retort. Half of the oily distillate consists of œnanthol, which is separated by distillation; after the œnanthol has distilled over, the temperature suddenly rises to 100°C. ($= 212^{\circ}\text{F.}$), and then remains stationary. The distillate which now comes over solidifies to a crystalline mass, the analysis of which led to the formula, $\text{C}_{11}\text{H}_{20}\text{O}_2$; this melts at 24.5°C. ($= 76.1^{\circ}\text{F.}$) and boils at $198^{\circ}\text{--}200^{\circ}\text{C.}$ ($= 388.4^{\circ}\text{--}392^{\circ}\text{F.}$) under a pressure of 90 mm. It appears to be a new member of the oleic acid series, forming a crystalline barium salt; on fusing with potash it gives acetic and nonylic acids; with bromine it forms a crystalline addition product, melting at 38°C. ($= 100.4^{\circ}\text{F.}$). The following equation represents the formation of œnanthol and of the new acid from ricinoleic acid:



The remainder of the distillate from the castor oil distilled under the above pressure chiefly at $250^{\circ}\text{--}255^{\circ}\text{C.}$ ($= 482^{\circ}\text{--}491^{\circ}\text{F.}$)

F.), but has not yet been investigated.—Ph. J. Trans., July 13th, 1878, p. 29.

Croton Oil—Examination of its Volatile Acid Components.—The investigations concerning the components of the fixed oil of the seeds of croton tiglium are in the main confined to two: that of Th. Schlippe, "On Croton Oil," and that of Geuther and Fröhlich, "On the Volatile Acids of Croton Oil." Besides a peculiar, resinlike, blistering substance, crotonol ($C_9H_{14}O_2$), Schlippe found in croton oil stearic, palmitic, laurinic, myristic, and oleic acid, a volatile crotonic acid, solid angelic acid, and several not well-characterized acids belonging to the acrylic acid series, all of which exist united to glycerin. Geuther and Fröhlich, to the contrary, could not find a liquid acid of the composition $C_4H_8O_2$, nor could they identify the solid acid as angelic acid. The liquid volatile acids were found by them to be acetic, butyric, valerianic, small quantities of cœnanthyllic, and, perhaps, higher members of the oleic acid series. The solid acid, it is true, was found to have the composition of angelic acid, but is, nevertheless, not identical with it, since it melts at $64^\circ C.$ ($= 147.2^\circ F.$), while angelic acid melts at $45^\circ C.$ ($= 113^\circ F.$). Geuther and Fröhlich have named this acid "tiglinic acid," and expressed the opinion that it might be found to be identical with the "methylocrotonic acid" of Frankland and Duppa. Identities with this latter acid were found in the general characters of the silver salts of the two acids, of the boiling-points of their ethyl-ether, and, approximately also, in their melting-points. The differences consist in the difference in the odor of the two ethers, and in the circumstance that Geuther and Fröhlich obtained a readily crystallizable salt of barium containing 5 mol. of water, whilst the methylocrotonate of barium was obtained in the anhydrous condition and crystallized with difficulty. With a view to establishing the relation of these two last-named acids, and also of further characterizing the volatile acids in croton oil, Dr. E. Schmidt, assisted by Dr. Johannes Berendes, has again investigated the subject, and has arrived at results which completely prove the identity of tiglinic and methyl-crotonic acid. The results are briefly given in the following: Operating with 20 pounds of croton oil, obtained from different sources, they obtained 200 grams of impure volatile acids, distributed about as follows: 5 pounds yielded 50 grams; 3 pounds, 32 grams; 8 pounds, 86 grams; the remaining quantity making up the 200 grams. These results seem to prove that

these acids, collectively, are present in very nearly constant quantities, since Geuther and Fröhlich had obtained 44 grams of crude acids from 4 pounds of oil. The method pursued, separating these acids in their crude condition from the oil, was that originally pursued by Schlippe, and consisted in saponifying the oil with soda, precipitating the resulting soap by salt, and collecting the brown mother liquor, which contained, besides glycerin, the volatile acids combined with soda. This liquid was acidified with sulphuric acid, and subjected to distillation, the distillate neutralized with soda, evaporated, the residue decomposed with sulphuric acid, and repeatedly exhausted with ether, which left the crude mixture of acids above named upon evaporation. By fractional distillation and other suitable methods of purification the authors obtained the following acids, which were completely identified by their accepted characters, saline combinations, etc.: *butyric, valerianic, and tiglinic acids*, all of which are volatilized below 200°C. ($= 392^{\circ}\text{F.}$). They obtained, besides, a series of volatile acids possessing higher boiling-points, which have not yet been completely characterized, but which appear to prove the correctness of Schlippe's observations that croton oil contains considerable quantities, relatively, of higher acids belonging to the oleic acid series. *Acetic acid* was also obtained from the above-named mixtures of crude acids, but a larger quantity was found in the residues of the sodium compound that had been shaken with ether, which contained, besides this, notable quantities of *formic acid*, the presence of which had escaped the notice of Geuther and Fröhlich, because, by an accident, these residues had been wasted. As regards the *tiglinic acid*, the authors found the quantity present to be very much less than that which had been given by Geuther and Fröhlich. A quantity of croton oil, prepared by H. Trommsdorff for the authors, from the seeds by bisulphide of carbon, though containing a somewhat larger quantity of tiglinic acid than the samples previously operated on, still contained much less than was obtained by the authors named, and the present authors are, therefore, of the opinion that, while the quantity of total acids appears to be very nearly the same in croton oils of different sources, the relation of the one acid to the other is not constant.—Arch. f. Ph., September, 1878, pp. 213–229.

Beeswax—Detection of Resin.—The frequent adulteration of beeswax with resin has prompted Dr. E. Schmidt to communi-

cate the following modification of Donath's method, whereby even the smallest quantities of resin may be rapidly and certainly determined: 5 grams of the wax are heated to boiling in a flask with four to five times the quantity of crude nitric acid (sp. gr. 1.32 to 1.33), and kept at that temperature for one minute; an equal volume of cold water is then added, followed by ammonia, with agitation, until the liquid smells strongly of it. If the liquid is then poured from the wax into a cylindrical vessel it will be found to have a *yellow* color if the wax is pure; while in the presence of resin the color will be more or less intensely red-brown. Being a colorimetric method, it is recommended to treat a sample of wax of known purity in the same way for comparison, when it will be noticed during the boiling with nitric acid that the resinous wax is affected much more energetically than pure wax. One per cent. of resin may be recognized very readily.—Arch. f. Ph., September, 1878, p. 212.

Beeswax—Detection of Ceresin, Paraffin, etc.—Mr. Max Buchner observes that *ceresin*—a mixture of refined paraffin and carnauba wax—has for several years been used for admixture with beeswax. The adulteration can be detected by its sp. gr., since the various kinds of *ceresin* have a sp. gr. of 0.858 to 0.901, while pure yellow wax has a sp. gr. of 0.959, and white wax 0.955. As a consequence pure beeswax will sink in a diluted alcohol of sp. gr. 0.945 to 0.950, while wax that is adulterated with *ceresin* will float in such liquid; and this test, recommended by R. von Wagner, answers all practical purposes. The detection of *ceresin* or paraffin by chemical means is accomplished by Mr. Buchner as follows: The suspected wax is boiled with concentrated alcoholic solution of potassa (1 p. potassium hydrate to 2½–3 p. 90 per cent. alcohol) for several minutes in a long test-tube, and the tube is then allowed to remain in a water-bath for some time to prevent congelation. If the sample of wax is pure the solution remains clear, while in the presence of *ceresin* the paraffin separates in form of an oily layer upon the surface of the strongly colored solution of potassa, and may be distinguished from the saponified mass upon its cooling by its lighter color. The complete separation, however, often requires a considerable time, hence the necessity of retaining the test-tube in the water-bath. The separation may be effected at once by adding alcohol to the mixture and heating in the water-bath.—Schweiz. Wochenschr. f. Ph., May 2d, 1879, p. 149.

Japanese Wax—Composition.—Dr. Eugen Buri has subjected the so-called Japanese wax to chemical examination. Inasmuch as this substance is readily saponifiable, and belongs to the glycerides, he regards the name "wax" inappropriate, and prefers to call it a tallow. Regarding its composition there have been two remarkable statements made: the first that it is composed of palmitin only, which would be remarkable, because all fats, whether of animal or vegetable origin, have hitherto been found to be mixtures of two or more glycerides; the second that it should contain dipalmitin, while the fats are generally regarded to be triglycerides. The author, in the present examination, has confined his experiments to the first statement, and he has determined this to be incorrect, and that Japanese wax is just as much a mixture of various glycerides as are all the other fats that have hitherto been examined. This having been determined, he regards the question of the occurrence of dipalmitin in the mixture as one of very difficult solution.

The Japanese wax examined by the author melts at 52° C. ($= 125.6^{\circ}$ F.). If it is rapidly cooled after melting, and again heated, it will melt at 42° C. ($= 107.6^{\circ}$ F.), and it does not again reach its first melting-point until after some time. When melted with water it communicates an acid reaction to it. It readily dissolves in commercial absolute alcohol when heated, and the greater part crystallizes out again on cooling, leaving a soft and more readily melting body in solution. The results of the author's examinations are summed up as follows: The so-called Japanese wax is a mixture of several glycerides, and is therefore not distinguished in this respect from other fats. The mixture of fatty acids obtained from it by saponification is, for the greater part, composed of palmitic acid.

The mixture contains, besides palmitic acid, another (or several) acid having a higher melting-point. It is positively determined that one acid, having a higher melting-point than stearic acid, exists. A small quantity of an oily acid is also present in the mixture.—Arch. f. Ph., May, 1879, pp. 403–409.

CARBOHYDRATES.

Lignin—New Reagent.—Professor Wiesner has examined *phloroglucin* (trioxybenzol, $C_6H_6O_3$, isomeric with pyrogallie acid, and produced by the action of potassic hydrate and heat upon

phloretin, gamboge, kino, quercitrin, filicic acid, etc.). If a drop of a $\frac{1}{2}$ per cent. solution of phloroglucin is dropped upon a pine chip and followed by a drop of hydrochloric acid, a handsome bright-red color, with a somewhat violet tinge, is soon produced. Upon drying the violet color becomes more distinct. The reagent is very sensitive. The smallest traces of woody structure in vegetable substance may readily be recognized by the aid of this reagent, and it is found far superior to sulphate of anilin, which is used and recommended for this purpose.—Ph. Centralh., July 11th, 1878, p. 257.

Nitro Compounds of Cellulose.—G. Wolfram gives the result of a comprehensive series of investigations made with a view to studying the nitro compounds of various kinds of cellulose, such as cotton, paper, hemp, straw, and also of gelatin, and gives the following résumé of his results:

1. By the action of nitric and sulphuric acids upon cellulose nitro compounds are formed, which vary with the quantities of the acids, the kind of cellulose, the duration of reaction, and the temperature of the acid mixture.

2. Four nitro compounds are producible: Pentanitro-cellulose, $C_{12}H_6(NO_2)_5O_{10}$; tetranitro-cellulose, $C_{12}H_8(NO_2)_4O_{10}$; trinitro-cellulose, $C_{12}H_7(NO_2)_3O_{10}$; dinitro-cellulose, $C_{12}H_8(NO_2)_2O_{10}$.

3. Three compounds may be obtained in the fibrous and powdered state.

4. The quantity of hyponitric acid in the nitro compound increases with the quantity of sulphuric acid, the concentration of the nitric acid, the duration of the reaction, and the height of the temperature of the acid mixture.

5. Increase of the temperature of the acid mixture not only increases the quantity of hyponitric acid in the product, but also facilitates the penetration of the cellulose, changes its structure, and gives to the pyroxylics and their solutions other physical properties.

6. The products produced by the nitrification of cellulose are mostly mixtures of nitro-cellulose in various stages of nitrification, which, with the exception of the pentanitro-cellulose, are difficult to produce by themselves, and cannot be completely separated by solvents.

7. Nitro compounds of cellulose containing more than 41.89 per cent. NO_2 contain nitric acid in their pores, which cannot be re-

moved by washing; those containing less than 22.22 per cent. NO_2 are mixed with cellulose that is not nitrated.

8. By a very concentrated sulphuric acid and nitric acid mixture the various kinds of cellulose are converted into identical compounds; by weaker acids, to the contrary, they are nitrated in variable proportions.

9. The more readily the fibre is converted into parchment by sulphuric acid, the more difficult it is nitrated; and the less the action of sulphuric acid, so much easier is it nitrated.

10. Strongly parchmented pyroxylin may be distinguished from those not or but little parchmented by partial reduction with sulphuric acid solution of sulphate of iron and coloration with iodine solution.

11. The solubility of the nitro-celluloses differs according to the composition or structure.

12. The production of a glassy layer upon the evaporation of a solution of pyroxylin is not only dependent on the substance itself, but also on the solvent.

13. By impregnating cotton with gelatin, or by the addition of gelatin to the acid mixture before nitrating, the conditions for the production of a partly pulverulent pyroxylin may be produced.—Ph. Centralh., January 9th, 1879, p. 13.

Collodium Cotton.—The preparation of pure gun cotton for solutions has hitherto been quite difficult, because it retains very tenaciously an acid compound that is difficult to remove by simple washing with water. According to E. Schering this may be readily accomplished by first treating the gun cotton with a weak solution of sulphurous acid, when it may be completely freed from the acid compound by final washing with distilled water. Gun cotton so treated produces a perfectly pure collodium, which is colored very faint yellow only by very sensitive iodine salts.—Ph. Centralh., May 15th, 1879, p. 205.

Starch—Chemical Characters.—F. Musculus and Dr. Gruber have made comprehensive chemical investigations of starch, whereby they have arrived at the following results:

By the action of diastase or hot diluted sulphuric acid the following products are obtained:

1. *Soluble Starch*.—This is insoluble in cold water, but soluble in warm water at 50° to 60° C. ($= 122^\circ$ to 140° F.). In the solid state it is handsomely blued by iodine; its solutions are colored

wine red by the same reagent. When dried in the air with excess of iodine it acquires violet, yellow, and brown shades. Rotatory power = + 218; reducing power = 6.

2. *Erythrodextrin*.—This name, chosen by Brücke, has reference to the red color which the body acquires by iodine. It is distinguished from "soluble starch" by being soluble in cold water, and is reddened by iodine in the solid state as well as in solution. It composes the greater part of commercial dextrin. Both of these substances are acted upon readily with the smallest quantity of diastase.

3. *Achroodextrin, α*.—Is not colored by iodine. Rotatory power = + 210; reducing power = 12. Is partially converted into glucose by diastase, but not with the same facility as No. 1 and No. 2.

4. *Achroodextrin, β*.—Rotatory power = + 190; reducing power = 12. Is not acted upon by diastase, at least not during twenty-four hours.

5. *Achroodextrin, γ*.—Rotatory power = + 150; reducing power = 28. Is not acted upon by diastase within one year. Hot dilute sulphuric acid converts it into glucose, but requires several hours.

6. *Maltose*.—Formula, $C_{12}H_{22}O_{11} + H_2O$. Rotatory power = 150; reducing power = 66. Indifferent to diastase under ordinary conditions. Fermentable.

7. *Glucose*.—Formula, $C_6H_{12}O_6 + H_2O$. Rotatory power = 57; reducing power = 100. Fermentable.

The numbers given for the rotatory and reducing power of the above are only approximate, for inasmuch as these substances do not crystallize, and do not form any solid combinations, it is impossible to obtain them perfectly pure. They show, however, that the dextrans, which are formed by the conversion of starch into sugar, lose their rotatory power in proportion to their approach to glucose, and that their reducing power is under the same conditions increased, and their indifference to diastase becomes greater.—*Zeitschr. Œst. Ap. Ver.*, October 20th, 1878, p. 473; from *Bull. de la Soc. Chim. de Paris*, July 20th, 1878.

Starch—Action of Diastase.—Musculus asserts that 3 parts of starch yield 2 of dextrin and only 1 of sugar, whilst Schwarzen's results, obtained at a temperature of 48° R. (= 140° F.), showed 1 of sugar and 1 of dextrin. These latter results are now confirmed by Maercker, who finds that this sugar is not dextrose but maltose, which has only two-thirds the reducing power of the

former; and as half the reducing power of the product resulting from the action of diastase on starch is due to maltose, the 4 starch groups must yield 3 of maltose and 1 of dextrin. At higher temperatures varying results have been obtained. At 65° R. ($= 178.2^{\circ}$ F.), the yield of maltose is lowered by several per cent.; at a still higher temperature a tolerably constant relation holds between maltose and dextrin (2 starch give 1 maltose and 1 dextrin). Possibly there are two diastase ferments, one of which produces much maltose and little dextrin, but is destroyed while the temperature is still comparatively low; while the other, destroyed at higher temperatures only, produces less maltose and more dextrin. The second diastase ferment appears not to act upon dextrin, whilst fresh unwarmed diastase readily converts the dextrin into sugar.—Landw. Versuchs-Stat., 22, p. 69; in J. Ch. Soc., December, 1878, p. 969.

Starch—Conversion into Glucose and Dextrin by Carbonic Acid.—F. M. Bachet and F. D. Savalle have found that by the action of carbonic acid in the cold or with heat starch is readily converted into dextrin and glucose, in the same manner as by dilute mineral acid. Under pressure, and at the higher temperature, the conversion takes place quite rapidly. Experiments have shown that the maximum action for a certain time is attained at 60° C. ($= 140^{\circ}$ F.). If barley, rye, or other amylaceous substances are mixed in a powdery condition with water saturated with carbonic acid in a close vessel, and the mixture is then heated to 60° C. ($= 140^{\circ}$ F.), with continual stirring, five to seven hours will suffice to convert all the starch into glucose; and if such liquid is subjected to fermentation, the quantity of alcohol produced corresponds to all of the starch contained in the material under operation. If, in addition, the pressure is increased to 8 atmospheres by the introduction of carbonic acid, the conversion takes place within one hour.

The presence of gluten assists the reaction very materially when operating with pure starch or potatoes; it is therefore advisable to add a certain quantity of rye, barley, etc., for the purpose of introducing such. A temperature of over 60° C. ($= 140^{\circ}$ F.), however, appears to destroy the gluten for this purpose.

The advantages of the new process (which is patented in Germany, probably also in France) are self-evident. It saccharifies amylaceous substances without communicating to the product either odor or taste not properly belonging to it, and is much

cheaper than either the process with malt or with mineral acids.—Ph. Centralh., October 31st, 1878, p. 413.

Saccharose—Influence of Various Substances.—Messrs. Pellet and Durin find that a solution of cane sugar on standing and exposure to heat undergoes less change the stronger it is. Glucose converts cane sugar into glucose in proportion to the quantity of the former. In a solution saturated with cane sugar this change does not take place. At certain temperatures mineral salts have a strong action upon cane sugar, whilst the effect of organic salts is very small.—Biedermann's Centralbl., April, 1879; in Ch. News, June 13th, 1879, p. 264.

Sugar—Refining with Chloride of Barium.—A process patented in France, consists in adding to 100 parts of sugar, in solution of 40° B., 64 parts of chloride of barium, heating to boiling, and adding caustic soda. Sucrate of baryta precipitates, and is decomposed by carbonic acid.—Ph. Centralh., October 31st, 1878, p. 411.

Crude Sugars—Determination of Water and of the Totality of Salts with Mineral Bases and Organic Acids.—E. Langier determines the moisture in crude sugars and saccharine matters by desiccation in hydrogen or coal gas previously purified and dried. The total mineral bases are determined by incineration in a current of oxygen at temperatures below the melting-points of chlorides. In a second portion of exactly double the weight of that used in the preceding experiment, the organic acids are extracted with ether according to Schlöesing's method, and half the ethereal extract is poured to the ash obtained by the former experiment, thus reconstituting the previously existing salts. The mixture is again dried in the stove as in the determination of water, and weighed. The second half of the ethereal extract is then neutralized with a standard alkaline liquid. From the result obtained the weight of carbonic acid equivalent to the organic acids is calculated. By deducting from the weight of the salts that of the ash, less the weight of the carbonic acid expelled, the weight of the total organic acids is obtained, and of the water which their salts retain at the temperature adopted for desiccation.—Compt. Rend., December 30th, 1878; in Chem. News, January 31st, 1879, p. 53.

Cane Sugar—Causes of Inversion.—Durin's observations lead him to the conclusion that the formation of glucose during the operation of refining cane sugar is merely accidental. The action of the ferment, as determined by Gayon, cannot take place at the

temperature to which the syrup is heated during the refining process. The formation of glucose under these conditions is of a purely chemical nature, and can be avoided. Heat, water, and time are the factors upon which the partial conversion of saccharose into glucose depends, and the influence of these agents, when the period of inversion of saccharose is reached and continued, also extends to the glucose, modifying the latter, changing its optical characters, and its fermentability becomes slower and incomplete. Solutions of saccharose containing glucose in quantities of 2, 3, 8, to 60 per cent. of the entire quantity of sugar, may be heated for 36 to 40 hours to 70° – 75° C. ($= 158^{\circ}$ – 167° F.), without any change in the crystallizable sugar, provided the alkalinity is equal to 0.0001 CaO. If the heat is continued 75 to 140 hours the alkalinity disappears, and inversion begins and becomes complete if the heat is continued longer; at the same time the glucose is changed as above stated. If, however, the syrup is kept in an alkaline condition, no change takes place by this prolonged heating.—Ph. Centralh., February 6th, 1879, p. 49.

Sugar—Amount Contained in the Nectar of Flowers.—Mr. Alex. S. Wilson has determined the amount of sugar in various flowers. The nectar was extracted with water, and the sugar determined before and after inversion by Fehling's copper solution. Many of the estimations were done in duplicate, and gave results that agreed perfectly. In the case of fuchsia, which is not deprived of its nectar by any insects in England, the nectary being inaccessible to native species, probably the whole amount of sugar formed is represented, but in the other cases the visits of bees, etc., may have reduced the amount considerably. In this case it is a clear, colorless liquid, having an acid reaction, and an intensely sweet taste; that of many others has the strong characteristic odor of honey:

Sugar in Flowers.

	Fruit sugar.	Cane sugar?	Total.
	M. m. g.	(as fruit). M. m. g.	M. m. g.
1. Fuchsia, per flower, . . .	1.69	5.9	7.59
2. Claytonia Alsinoides, per flower, .	0.175	0.238	0.413
3. Everlasting pea, per flower, .	8.88	1.60	9.93
4. Vetch (Vicia Cracca), per raceme,	8.15	0.01	8.16
5. " " per single flower,	0.158	—	0.158
6. Red clover, per head, . . .	5.95	1.98	7.93
7. " per floret, . . .	0.099	0.033	0.132
8. Monk's head, per flower, . . .	4.63	1.78	6.41

Approximately, then, 100 heads of clover yield 0.8 gram sugar, or 125 give 1 gram, or 125,000 1 kilogram of sugar; and as each head contains about 60 florets, 7,500,000 distinct flower-tubes must be sucked in order to obtain 1 kilogram of sugar. This shows what an amazing amount of labor the bees must perform, for their industry would thus appear to be indispensable to their very existence. Another point worth notice in these results is the occurrence of what appears to be cane sugar, and that in the case of fuchsia in the proportion of nearly three-fourths of the whole. This is remarkable, as honey is usually supposed to contain no cane sugar, its presence being usually regarded as certain evidence of adulteration. The question therefore arises, whether this change, which takes place while the sugar is in the possession of the bee, is due to the action of juices with which it comes in contact while in the honey-bag or expanded œsophagus of the insect, or whether the process of inversion goes on spontaneously, as may, perhaps, be the case.—Ch. News, August 23d, 1878, p. 93.

Glucose—Occurrence in Sphero-crystalline Form in Various Drugs.—Dr. Herm. Braun draws attention to the occurrence of sphero-crystalline glucose in several drugs recently examined by him. Hitherto, this occurrence in drugs has never been noticed. The crystals possess great resemblance to the corresponding forms of inulin, for which, indeed, they might be mistaken, if it were not for their ready solubility in water, and their power to at once reduce Fehling's solution. Sphero-crystals that have hitherto been noticed are fats, as in cacao seed, nutmegs, cocculus fruits, or hesperidin in unripe oranges and lemons that had been subjected to certain treatment. Certain organic compounds in the epidermis of *Cocculus laurifolius*, the leaves of *Reseda Luteola*, L., the stipule and mesophyll of *Marattia cicutæfolia* and *Angiopteris erecta*, etc., have also been found in the spheroidal form. The drugs in which Dr. Braun noticed sphero-crystalline glucose are the tubers of *Melanthium Cochinchinense*, Lour., in the tubers designated as belonging to *Asparagus lucidus*, but regarded to be identical with *Melanthium*, and in the common date, *Phœnix dactylifera*. The author describes the microscopic characters of the parts in which the glucose are contained very minutely, and illustrates his paper with several cuts, showing the sphero-crystals contained in the parenchym cells of the *Melanthium* tubers, and the same form of crystals, associated with single

crystals, in the sarcocarp of the date. He is of the opinion that these peculiar forms of glucose are of more frequent occurrence than is generally supposed, and that their discovery has hitherto been prevented by their ready solubility.—*Zeitschr. Oest. Ap. Ver.*, July 20th, 1879, pp. 337–341.

Glucose — Compounds with Cupric Oxide.—Some years ago (*Pflüg. Arch. C.*, 228) Salkowski stated that he had succeeded in obtaining a compound, definite in its composition, of glucose and hydrated cupric oxide. The compound was described to be blue-green, and was stated to contain 1 mol. glucose and 5 mol. hydrated cupric oxide. It was also stated to be necessary to its formation to add to 1 mol. glucose in solution a solution of 5 mol. of cupric sulphate and 10 mol. sodic hydrate, whereby all the copper and glucose are precipitated, and sulphate of sodium remains in the neutral solution.

W. Müller and J. Hagen have now repeated Salkowski's experiments, and find, that while a precipitate containing both cupric oxide and sugar is readily obtained under the conditions named, the precipitation of the sugar is by no means complete, and it appears simply to adhere tenaciously to the precipitate, and not to form a definite compound. The sugar is gradually removed from this association by washing.

It has been stated by Hoppe-Seyler that a solution of glucose is capable of dissolving hydrated cupric oxide. The authors have made experiments in this direction also, and prove conclusively that aqueous solutions of glucose do not dissolve hydrated cupric oxide.

Furthermore, Fileti (*Chem. Centralbl.*, 1875, 340) described two so-called copper glycosates. The authors have found that under the conditions given by Fileti, glycosates of copper result, but that they invariably contain potassa, and are consequently double compounds. These latter have been the subject of study, and they have determined two double compounds, the one containing 1 mol. glucose, 1 atom copper, and 1 atom potassium; the others containing an additional atom of copper.—*Schweiz. Wochenschr. f. Ph.*, November 15th, 1878, p. 403.

Glucose—Determination with Alkaline Copper Solutions.—Dr. F. Soxhlet has made some interesting experiments upon the relation of alkaline copper solution to glucose as reducing agent, by which he shows that the assumption that 1 eq. of glucose

reduces 10 eq. of cupric oxide is not correct, and that, to the contrary, glucose is capable of reducing variable quantities of cupric oxide, according to circumstances, the fluctuations being between 1 : 8.5 and 1 : 12.5. The reduction values of alkaline solution of copper—for instance, of Fehling's solution—are therefore purely empiric, and apply only for solutions of copper and of glucose of the same strength as those with which the value was ascertained. Dilution or concentration of the one or the other alters the result materially.—Ph. Centralh., August 29th, 1878, p. 329.

The above observations of Soxhlet have induced Mercker to take up the subject again, and he has shown by his experiments that if the proper proportions of glucose and reagent are maintained constant results are also assured, and that particularly accurate results are obtained by the gravimetric method. This is as follows: 34.632 grams crystallized cupric sulphate in 1 liter of water, and 63 grams caustic soda and 173 grams of Rochelle salt in a like quantity of water, are kept separately for use. 25 cc. of each of these solutions are poured into a beaker, the glucose solution, which must not contain more than 0.12 gram of glucose, however, is added, and the whole is diluted to 100 cc. with water. The beaker is now placed in a water-bath, filtered hot after 20 minutes, and the filter washed with 300 cc. of boiling water. The filter is then burnt in a platinum (?) crucible, and the cuprous oxide reduced to metal, by the aid of a Rose's cover, in a current of hydrogen at a red heat.

The author's results with the above process are given in the following:

Glucose.	Reduced copper.	Glucose.	Reduced copper.
50	100.0	100.0	181.5
65	126.5	100.0	182.5
75	144.0	111.1	197.0
100	182.0	111.1	195.8

For the particulars of the manipulation and calculations for these determinations, the reader is referred to the original paper (Chem. Centralbl., No. 53, 1878).—Ph. Centralh., January 16th, 1879, p. 19.

Glucose—Mulder's Method of Determination.—In 1851 G. J. Mulder had given a method for determining the glucose in cane sugars, which consisted in heating a solution of the sugar with

alkaline solution of copper for one hour at 60° C. (= 140° F.), rapidly filtering off the cuprous oxide, oxidizing it by fuming nitric acid, and weighing; 1 gram of glucose, according to Mulder, being represented by 1.744 gram of cupric oxide so obtained. Other experimenters have since found different numbers, and W. D. Gratama has recently again experimented with the process, and finds that with a solution of copper, prepared by Violette's formula (?), 1 part glucose will reduce 2.268 parts of cupric oxide. The results correspond among themselves when the same cupric solution is employed, but do not when other solutions are used; even when such solution is prepared by the same formula. He regards it, therefore, necessary that each lot of cupric solution must be standardized for itself, and the method is only applicable to solutions containing only glucose. In the presence of saccharose, also, corresponding results are not obtained, and Mulder's method is, therefore, faulty for this purpose.—Pharm. Centralh., April 3d, 1879, p. 138.

Glucose—New Reaction.—Mr. David Lindo finds that if the yellow crystalline compound obtained by the action of nitric acid on brucia (see Proceedings, 1878, p. 590) is dissolved in a solution of potassa or soda, a fluid is obtained which glucose, owing to its action as a reducing agent, changes from yellow to intense blue. To show this reaction, dissolve half a grain of the substance in one fluid ounce of liquor potassa, B. P. Place about 60 minims of the amber-colored solution thus obtained in a moderately sized test-tube, heat to boiling, then add two or three drops of a dilute solution of grape sugar. The color of the fluid will change almost immediately to intense blue. Cane sugar has little or no action on the test. The author had hoped to make this beautiful test available for testing for sugar in urine, but found it to be of little value, since the normal constituents of urine are not without action on it.—Ch. News, September 20th, 1878, p. 145.

Glucose and Invert Sugar—Modification of Sachsse's Test.—Heinrich finds Sachsse's test for glucose and invert sugar in the presence of saccharose faulty on account of the large percentage of alkali present, which, acting upon saccharose, converts a portion into glucose, and to that extent vitiates the result. It is also necessary to determine the titre of the test solution each time it is made, since it is impossible to prepare such solution of uniform strength. Sachsse's solution is made by dissolving 18 grams pure

mercuric iodide, 25 grams potassic iodide, and 80 grams caustic potassa in 1 liter of water. Heinrich finds that 10 grams of caustic potassa is sufficient, and proves by his experiments that saccharose is not affected by a solution so modified, the results indicating accurately the glucose or invert sugar, or both, that may be present in solution of cane sugar. The titre of the test solution is established by means of pure glucose, prepared by the following method of Neubauer: Cane sugar is dissolved in alcohol containing hydrochloric acid. The glucose which deposits on standing is washed with alcohol of 65 per cent. until neutral, finally with absolute alcohol under pressure, and dried.

The test is carried out as follows: A measured quantity of the mercurial solution is heated to boiling, and sugar solution is added, until all the mercury is reduced. To determine the first a few drops of solution of stannous chloride in caustic potassa are dropped into a number of small capsules, and a few drops of the mercurial solution in operation are added before each addition of fresh sugar solution (a black color is produced as long as mercuric salt is present). This is continued until the mixture in the capsules remains colorless.

Heinrich observes, in addition, that the mercuric solution must be kept boiling as continuously as possible, and particularly before it is tested with stannous chloride. In the presence of small quantities of invert sugar in cane sugar, a very small quantity (2.5 to 5.0 cc.) of the mercuric solution should be employed; otherwise too large a quantity of the sugar solution will be required. The large excess of alkali in Sachsse's original solution does not interfere with accurate results when pure solutions of glucose or invert sugar are to be tested.—Schweiz. Wochenschr. f. Ph., November 8th, 1878, p. 391.

Milk Sugar—Reductive Action upon Alkaline Solution of Copper.—H. Rodewald and B. Tollens point out that while chemists are agreed on the reductive power of dextrose, there is great discrepancy concerning lactose, 1 molecule of which is considered to represent various quantities of cupric oxide, ranging from $6\frac{2}{7}$ to 8 atoms. They find that the exact quantity required is 7.47 atoms of copper to 1 molecule of milk sugar = 6.700 milligrams of milk sugar to 1 cc. of Fehling's liquor. They recommend that this reagent should not be prepared in quantities beforehand. 60 grams of the best caustic soda and 173 grams of recrystallized tartrate of potash and soda are dissolved in half a liter of

water, whilst 34.639 grams of pure cupric sulphate are dissolved separately in another half liter. Equal volumes of these two liquids are mixed when wanted.—Ber. d. d. Ch. Ges., No. 17, 1879; in Ch. News, May 2d, 1879, p. 195.

Honey.—Since the introduction of bees to the Pacific Coast the Indians have acquired a taste for honey. The climate being mild the bees increase rapidly, and many swarms yearly escape to trees and rocks, thus giving the Indians a chance to obtain the honey. Some California Indians have domesticated the wild bees. In Southern California the Indians cut down the trees containing bees, put them in a sack, carry away the honey to eat, and sell the bees for one dollar a swarm, the purchaser taking all risks of getting a queen.—Dr. E. Palmer, A. J. Ph., November, 1778.

California Honey.—The report that California strained honey has been largely adulterated with glucose, and accordingly condemned in English markets, naturally causes some unpleasant feeling among the beekeepers of the Pacific Coast. A producer, writing to the "Pacific Rural Press," offers the following test for detecting adulteration: "Take a quantity of honey and add one part of water, dissolving the honey thoroughly by stirring. Then add alcohol of 80° until a turbidity is formed, which does not disappear on shaking. If glucose syrup is present in the honey, soon a heavy deposit of a gummy, milky mass will form, while with pure honey there will be only a very slight, milky appearance observed." The same writer says that California honey taken in May generally candies in a few days after it is extracted. Later in the season, when the air is less humid, the honey gathered is white, very thick and heavy, weighing 12 to 12½ pounds to the gallon of 231 cubic inches, and does not candy so readily, as some samples have been kept three years without any symptom of change. A different class of pasturage comes on in August, and continues through the fall months; the air becomes more humid as the rainy season approaches, and the honey gathered is thinner, has more color, and candies very soon, differing from April and May honey in flavor. In the Atlantic States all honey made through the entire season candies upon the approach of winter; and a large dealer in Cincinnati says all good honey becomes candied during the winter in that climate. San Francisco dealers rule that candied honey is reduced in value from one to three cents a pound; yet of samples of California honey sent to France,

complaint was made that it was not candied, as no other honey could be readily sold there. The magnitude of the California honey trade may be judged from the circumstance that over 300 tons of extracted honey was produced last year in Ventura County alone.—A. J. Ph., June, 1879, p. 320; from Sci. Amer., March 15th, 1879.

Tazma—An Ethiopian Honey.—A. Villiers draws attention to a honeylike substance which is found in Ethiopia in holes and cavities in the ground, and is said to be the product or secretion of a gnatlike insect. The author found this substance to be composed as follows: Fermentable sugar (levulose with $\frac{1}{2}$ glucose, and no saccharose), 32 per cent.; mannit, 3 per cent.; dextrin, 27.9 per cent.; water, 25.5 per cent.; ash, 2.5 per cent.; other components and loss, 9.1 per cent.—Ph. Centralh., June 12th, 1879, p. 239; from Compt. Rend., 88.

Clarified Honey.—In a paper read by Mr. George C. Close, before the King's County Pharmaceutical Society, he makes some practical remarks on clarifying honey. The direction of the Pharmacopœia—to "take of honey any convenient quantity, melt it by means of a water-bath, and then remove the scum,"—is quite simple; but in practice the process is not so brief. It is impossible to remove all the scum in the ordinary way without wasting much of the honey, especially if the skimming is performed while it is hot. But if, previous to the skimming, a little water is gently poured in, it will remain on the surface of the honey, scarcely mixing at all with it, while the scum will rise to the surface of the water, thus becoming completely separated from the honey, when it can be removed with a spoon or skimmer with the greatest facility. The water may then be drawn off from the surface, if necessary, but the author has found it usually better to leave about 5 per cent. of water in the honey, to prevent it from granulating, and this proportion of water is quite sufficient for the operation of skimming.—Drug. Circ., January, 1879, p. 28.

Honey—Purification.—Julius Müller uses for this purpose, alumina, as made by Löewig's patent. This is a damp mass, containing about 10 per cent. of anhydrous alumina, prepared by adding to a solution of alumina in soda enough lime to convert the alumina into calcium aluminate, dissolving the latter in hydrochloric acid, and then adding a second quantity of calcium aluminate, equal to the first, when all the alumina separates in a gelatinous condition, and only calcium chloride remains in

solution. The author's process for purifying honey is as follows: 10 kilos of crude honey are heated in a tinned kettle with 20 kilos of water, 300 grams of the above-described alumina, previously made into a thin milk with water, are added, and the mixture is heated until it foams up. It is then transferred to another vessel, allowed to stand over night, strained, and evaporated to the proper consistence. The resulting honey is bright yellow, perfectly limpid, and keeps indefinitely.—New Rem., February, 1879, p. 49; from Pharm. Zeit., 1878, No. 79.

Referring to the above method, "Pharmaceutische Zeitung" (1879, No. 10) observes that if the honey has an acid reaction this might cause the solution of some of the alumina, and thereby contaminate the product. This may, however, be entirely avoided by adding at the same time a little carbonate of magnesium mixed with water. The honey obtained by this process is clear as crystal.—New Rem., June, 1879, p. 181.

Honey—Composition.—J. C. Brown communicates the following table, showing the composition of authentic specimens of honey from various sources:

	English.	Welsh.	Normandy.	German.	Greek.	Lisbon.	Jamaica.	California.	Mexican.
Water, expelled at 100° C.....	19.10	16.40	15.50	19.11	19.80	18.80	19.46	17.90	18.47
Water, expelled at a high temperature and loss.....	7.60	6.56	4.95	11.00	7.80	6.66	7.58	8.13	10.03
Levulose.....	36.60	37.20	36.88	33.14	40.00	37.86	33.19	37.83	35.96
Dextrose.....	36.55	39.70	42.50	36.58	32.20	34.94	35.21	36.01	35.47
Cane sugar (?).....	?					1.20	2.20		?
Wax, pollen, and insoluble matter.	trace.	trace	trace.	trace.	0.05	1.00	2.10	trace.	trace.
Mineral matter.....	0.15	0.14	0.17	0.17	0.15	0.14	0.26	0.11	0.07

The specific gravity of honey is about 1.41, but varies slightly with the proportion of water.—Analyt., 1878, p. 267; in J. Ch. Soc., December, 1878, p. 969.

ORGANIC ACIDS.

Oxalic Acid—Production in Animal Matter as a By-product of the Reaction of Hydrochloric Acid and Chlorate of Potassium.—Van Melckebeke has observed that when animal substances are treated by the method of Babo and Fresenius with dilute hydrochloric acid and chlorate of potassium, oxalic acid is constantly obtained as a by-product. 100 parts of beef, of milk, and of calf's

liver yielded respectively 0.021, 0.117, and 0.9 parts of the acid. This important observation has recently, in France, led to the reversion of judgment in a supposed case of poisoning by oxalic acid, in which the verdict of guilty had been pronounced. A re-examination of the corpse by a commission of experts, among which Professor Wurtz proved that death had been caused by chronic disease and not by poison.—Ph. Centralh., July 25th, 1878, p. 273.

Acetic Fermentation and Alcoholic Oxidation.—Ch. Blondeau has studied the causes that are involved in the formation of vinegar. If sugar-water is mixed with an albuminous substance, for instance, casein, mycodermae aceti are formed, and the sugar is converted into acetic acid. The mycodermae will continue to grow as long as the liquid is acid; but if it becomes alkaline by the putrefaction of the casein, infusoria are formed, and the mycodermae disappear. This process doubtless occurs in the vats of the starch factories, which are rich in acetic acid.

The view of Pasteur, that the mycodermae act as carriers of the oxygen of the air to the alcohol and thus converts it into acetic acid, is accepted by Blondeau only with certain restrictions. He holds the view that the alcohol is not changed into acetic acid until the mycodermae have formed a pellicle upon the surface of the liquid, and that oxidation process is due to physical, and not to physiological action. He proved this to his satisfaction by producing an artificial pellicle—membranes produced with sulphuric acid and paper—upon alcoholic liquids, and obtaining the desired result. He compares this oxidizing action to that which results by the action of platinum black, or the respiration of plants and animals.—Pharm. Centralh., October 31st, 1878, p. 414.

Vinegar Essence.—Under this name highly concentrated acetic acid has for some time been introduced into commerce with directions to reduce it in certain proportions with water, so as to form vinegar suitable for table use at pleasure. Much of that found in the European (German) markets, however, furnishes a vinegar that is neither pleasant to the taste or smell, and if diluted as directed does not yield a vinegar that is strong enough for pickling, etc. Recently a German chemical establishment*

* The method of preparing this "essence" is not given, hence it is necessary to omit the name of the firm. The idea is one, however, that deserves attention.—REP.

has introduced a "vinegar essence" in which all of these objections are overcome. It is put up in small vials, sufficient to make 1 to 4 or more wine bottles full of vinegar, and the product has both a pleasant taste and aroma, and is quite pure. It may be obtained colorless or wine-red (without anilin), and containing 80 per cent. of acetic acid, and furnishes, when diluted, a vinegar containing about $4\frac{1}{2}$ per cent. monohydrate.

The advantages of a vinegar essence, so called, properly prepared, are obvious. It may be kept for any length of time without change, does away with the storage of vinegar in barrels, and may be used to make vinegars of various strengths, suitable for pickling or other purposes.—Ph. Centralh., July 25th, 1878, p. 278.

Acetate of Alumina—Antiseptic Value.—Dr. Paul Bruns finds this compound, first introduced by Burow (1857) for dressing wounds, to be a really valuable antiseptic, and recommends it to be applied on the bandages in the form of solution. The strongest solution should not exceed 3 per cent., and may be prepared by dissolving 72 grams of alum and 115 grams of plumbic acetate separately in water, mixing, bringing to the measure of a liter, and filtering. For ordinary use it is diluted with 3 to 6 times its volume of water. The solution has the power to corrode steel and brass instruments. It arrests and prevents putrefaction, is a good deodorant, and destroys, even in very dilute solution, bacteric life.—Ph. Centralh., September 26th, 1878, p. 361.

Acetonitrate of Iron—Preparation and Properties.—Several years ago Mr. Scheurer-Kestner pointed out the existence of a series of salts formed by the combination of peracetate and pernitrate of iron. The description given of these salts is not very clear or definite, and leads to the supposition that they are quite readily decomposable; but, inasmuch as such compounds, if they could be prepared readily and of definite and permanent composition, would be useful additions to medicine, Mr. John Williams has undertaken their investigation, and now communicates a preliminary note on the subject. Mr. Kestner mentioned various processes for producing these salts, and Mr. Williams has obtained salts of variable color and properties by following them, which, however, upon recrystallization, finally yielded one and the same compound, which seems to possess considerable stability. Perhaps the best mode of forming this compound—which the author

names acetonitrate of iron—is to dissolve hydrated ferric oxide, which must be quite recent and well washed, in a mixture of glacial acetic and nitric acids, in which acetic acid is in considerable excess (say two or three parts to one); the hydrated oxide contains sufficient water to dilute the solution, and the oxide must be added slowly, so as to avoid very great elevation of temperature. The solution so formed in twenty-four hours deposits a quantity of the double salt in hard, well-formed crystals. These, drained from the mother liquor, can be dissolved in a small quantity of warm (not boiling) water, strained, if necessary, and allowed to crystallize. The crystals so deposited have all the characters assigned to

Tetracetodinitrate of iron, and the author assumes that they may be taken as being represented by the formula given for that compound. The crystals were found to be quite permanent, and so slightly deliquescent that they can be readily kept in paper for several days without spoiling. They are very soluble in water, in the cold or gently warmed, but the solution of the salt is decomposed by boiling, basic compounds being deposited, which cannot afterwards be got into solution. It is freely soluble in alcohol, but practically insoluble in ether. The various solutions of the salt have a pure styptic taste, quite free from acidity, and not by any means as disagreeable as tinctures of perchloride of iron; but neither the aqueous nor alcoholic solutions keep well, as they are liable to gelatinize after being kept a few days or weeks. A solution of 2 drachms of the salt in a mixture of one ounce of glycerin and 3 ounces of water has, however, kept well, and promises to be a success. The salt, being definite, crystallized, and non-deliquescent, promises to be advantageously applied in medicine.—Ph. J. Trans., December 7th, 1878, p. 465.

Glycolide.—T. H. Norton and J. Tcherniak adopt the following method for the preparation of glycolide: They dissolve sodium in 15 parts of absolute alcohol, and add a concentrated alcoholic solution of chloracetic acid. After standing some hours almost the whole of the sodium chloracetate separates as a white precipitate. This is collected upon a funnel, drained by means of a filter-pump, and dried. It is then heated to 100° C. (= 212° F.) in a stove, and when perfectly dry the temperature is gradually raised to 150° C. (= 302° F.). It is well to spread out the salt over a large flat surface, stirring from time to time. After thus

heating the salt for two or three days it is withdrawn from the stove, powdered, and taken up again with boiling water, thrown upon a filter, and washed as long as the washings are precipitated by nitrate of silver. The residue on the filter, dried at $200^{\circ}\text{C. (= }392^{\circ}\text{ F.)}$, is perfectly pure glycolide.—Ch. News, July 5th, 1878, p. 8; from Comp. Rend., May 27th, 1878.

The same authors contribute the following new method for preparing

Ethylic Glycolate.—Glycolide is sealed up in tubes with an equivalent quantity of absolute alcohol, and heated for several hours to $200^{\circ}\text{C. (= }392^{\circ}\text{ F.)}$; the operation is complete when the glycolide has entirely disappeared. The contents of the tubes are diluted with water, and carbonate of potassium is added, enough to separate all the ether which floats on the surface of the saline solution. It is dried and distilled. The yield is almost theoretic.—Compt. Rend., July 1st, 1878; in Chem. News, July 26th, 1878, p. 46.

Inactive Valerianic Acid (Isobutylformic Acid).—Dr. Ernst Schmidt has made some interesting observations upon this acid and its salts. The extensive literature upon the subject of valerianic acid and its compounds evidences the greatest disparity in the observations made by different authors. This is owing to the circumstance that until within a comparatively short period the existence of a number of isomeric valerianic acids was not known, and hence the differences observed could not be properly explained. According to the latest theoretical views there exist four isomeric valerianic acids, $\text{C}_5\text{H}_{10}\text{O}_2$, namely:

1. *Normal valerianic acid or sentylic acid*, $\text{CH}_3, \text{CH}_2, \text{CH}_2, \text{CH}_2, \text{COOH}$.

2. *Trimethylacetic acid*, $\text{CH}_3, \text{CH}_3, \text{C}, \text{CH}_3, \text{COOH}$.

3. *Isovalerianic acid or isobutylformic acid*, $\text{CH}_3, \text{CH}_3, \text{CH}, \text{CH}_2, \text{COOH}$.

4. *Methylethylacetic acid*, $\text{CH}_3, \text{CH}_2, \text{CH}_3, \text{CH}, \text{COOH}$.

Of these four acids, normal valerianic or sentylic acid and trimethylacetic acid have only been obtained artificially, while iso-valerianic or isobutylformic acid, *i. e.*, formic acid in which one atom of H is replaced by one atom of isobutyl, and probably also methylethylacetic acid, *i. e.*, acetic acid in which methyl and ethyl each replace one atom of H, are found naturally in vegetable and animal substances. The very interesting investigations of Er-

lenmeyer and Hell (Liebig's Annalen, vol. 160, 264) upon the valerianic acids from various sources, have shown that the differences observed in valerianic acids are not due, as was the opinion of Berzelius, to circumstances attendant upon the experiment, but that these differences resided in their constitution, and that valerianic acid from valerian root contained, besides formic acid, acetic acid, and an acid boiling at 180° – 185° C. ($= 356^{\circ}$ – 365° F.), two acids, having the composition $C_6H_{10}O_2$, in variable proportions. Of these two valerianic acids the one is optically inactive, and identical with isobutylformic (isovalerianic) acid; the other is optically active (dextrogyrate) and has a constitution which is expressed by the name "methylethylacetic acid." Similar relations are found in valerianic acid produced by the oxidation of amylic alcohol. According to Pasteur amylic alcohol is composed of two isomeric alcohols, the one optically inactive, the other lævogyrate, and separable from each other by their conversion into amylsulphates of barium. The inactive alcohol yields the inactive valerianic acid, and being present in great preponderance the commercial acid is largely composed of the inactive acid, and under circumstances may compose the whole of it. Hitherto the ethylic ether and the barium and silver salt were the only compounds of the pure inactive acid that had been prepared, for which reason Mr. Schmidt, assisted by Mr. Rudolph Sachtleben, undertook the preparation and characterization of some of its other compounds.

Preparation of Inactive Valerianic Acid (Isobutylformic Acid).

—The ether of this acid had first been obtained by Frankland and Duppa, by the action of sodium upon isopropyl iodide and acetic ether. Erlenmeyer and Hell subsequently obtained the acid from isobutylic alcohol, and their method was adopted by the present author, with some modifications, for its preparation. The isobutylic alcohol (pure, and boiling at 107° – 108° C. ($= 124.6^{\circ}$ – 126.4° F.)) was converted into iodide by Wurtz's method: 300.0 iodine and 200.0 isobutylic alcohol, and a little water, were placed into a well-cooled flask, and 30.0 common phosphorus added gradually in small portions. At first the reaction is quite violent, and often accompanied by flame, but after one-third of the phosphorus has been added, the reaction almost ceases, and it may be added in larger portions. The brown liquid is transferred to a water-bath and heated, with a reversed condenser attached, whereupon violent reaction again sets in, accompanied by a great

rise in the temperature, and consequent lively boiling of the liquid. After this reaction has abated the heating is continued until the liquid becomes colorless; it is then mixed with water, and washed until the acid is completely removed. The crude isobutylic iodide is then repeatedly rectified, and the product passing between 115° and 120° C. ($= 239^{\circ}$ and 248° F.) collected for further conversion. The iodide is now converted into cyanide by heating 50.0 of a mixture composed of 300.0 isobutylic iodide, 150.0 alcohol, and sufficient water to beginning separation of iodide (making in all about 500.0), with 15.0 cyanide of potassium, in sealed tubes or flasks, which should be about half filled to prevent breakage by pressure, for two days, to 100° C. ($= 212^{\circ}$ F.); the liquid is now deep brown, and forms, on cooling, a crystalline magma, owing to separation of iodide of potassium. By the aid of a little alcohol this is transferred to a suction filter, whereby an alcoholic solution of isobutylic cyanide with an insignificant proportion of undecomposed isobutylic iodide is obtained, which, upon simple distillation, is sufficiently pure for further conversion. The conversion of the cyanide into isobutylformic acid is then accomplished by heating it with excess of concentrated alcoholic solution of potassium hydrate in a retort with reversed condenser, upon a water-bath, until ammonia is no longer given off, for which three days are required. The alcohol is distilled off, the isobutylformic acid is freed from the residual mixture of potassa salt and potassium hydrate by the careful addition of sulphuric acid, the separated acid being decanted and further removed by agitating the residue with ether. It is now further purified by drying with dehydrated sulphate of sodium, agitation with metallic mercury to remove iodine that may be held in solution, treatment with anhydrous phosphoric acid to remove last traces of water, and simple distillation. So obtained isobutylformic acid boils constantly at 175° C. ($= 347^{\circ}$ F.). under a pressure (not connected) of 754.8 mm., and constitutes a colorless oily fluid, having the unpleasant odor of ordinary valerianic acid, and a sp. gr. of 0.93087 at 17.4° C. ($= 62.8^{\circ}$ F.). The analytical figures obtained correspond to the formula $C_5H_{10}O_2$. Subjected to the polariscope no deflection could be observed.

Salts of inactive valerianic acid (isobutylformic acid), when recently prepared, are odorless, but on keeping soon acquire the odor of the free acid, owing to the partial decomposition and formation of a basic compound. The salts of the alkalies and of

the alkaline earths are readily soluble in water; those of the metals with more difficulty, and these latter are more soluble in the cold than by the aid of heat. Cold saturated solutions, therefore on heating, deposit considerable quantities of certain salts, such deposits being redissolved on the cooling of the solutions if the heat is not too long continued. If heated for some time at 100°C. ($= 212^{\circ}\text{F.}$) the more soluble neutral salt appears to be converted into the less soluble basic salt, a property which the inactive valerianic acid shares with normal valerianic acid, Lieben and Rosis having observed the same disposition to form basic salts in salts of the latter acid. On this account dilute solutions of metallic salts must be concentrated with moderate heat.

Isovalerianate (isobutylformate) of sodium is obtained in the form of a white, very hygroscopic salt, having no definite crystalline form. The solution obtained by saturating the acid with sodium hydrate, or carbonate, evaporated to syrupy consistence and placed over sulphuric acid, congeals to a stiff jelly, which finally changes to a white saline mass.

Isovalerianate of potassium possesses the same character as the sodium salt.

Isovalerianate of ammonium is very unstable, losing ammonia during its evaporation, and forming gradually an acid, feathery, crystalline mass over sulphuric acid.

Isovalerianate of calcium is formed by saturating the acid with recently precipitated carbonate of calcium, evaporating the solution at a moderate heat, and finally spontaneously over sulphuric acid. Well-formed, long, prismatic crystals are thus obtained, which have the composition $(\text{C}_5\text{H}_9\text{O}_2)_2\text{CA} + 3\text{H}_2\text{O}$, are tolerably permanent, and effloresce but slowly.

Isovalerianate of barium, as obtained by the authors, corresponds in all respects with the description of Erlenmeyer and Hell.

Isovalerianate of zinc, as prepared by various methods, was identical in composition, $= (\text{C}_5\text{H}_9\text{O}_2)_2\text{Zn} + 2\text{H}_2\text{O}$. It forms large, white, glistening scales, which feel fatty to the touch. When kept over sulphuric acid it loses all of its water of crystallization, as does the zinc salt of the ordinary valerianic acid. Like the latter, also, the salt melts at 80°C. ($= 172^{\circ}\text{F.}$), as stated by Stallmann, and loses valerianic acid. Trommsdorff had maintained that ordinary valerianate of zinc melts at 140°C. ($= 284^{\circ}\text{F.}$), and that it does not lose its acid at that temperature; Riegel

found it to melt completely at 150° – 160° C. ($= 302^{\circ}$ – 320° F.) and then to lose acid. Some experiments were also made with a view to determine the composition of the zinc salt prepared from ordinary valerianic acid. Wittstein has made the statement that valerianate of zinc, prepared either by evaporation of the solution or by precipitation, is anhydrous, but that it may be made to retain a large percentage of water, if at the moment of its formation a comparatively small quantity of water is present. Such a salt is said to have the formula $(C_6H_9O_2)_2Zn + 12H_2O$. Other authors, Trommsdorff, Grote, Riegel, Prince Lucien Bonaparte, Stallmann, make no mention of the water retained by the compound. In textbooks valerianate of zinc is uniformly stated to be anhydrous, and this is evidently also the acceptation of the Pharm. Germ., which states that 100 parts of valerianate of zinc shall contain 30 parts of oxide of zinc. The authors have been unable to obtain a compound containing $12H_2O$, but they have obtained uniformly from ordinary valerianic acid, by all the methods pursued, a compound corresponding to the formula $(C_6H_9O_2)_2Zn + 2H_2O$. Such a compound contains 26.78 per cent. oxide of zinc, and the requirement of the Germ. Pharm. is therefore incorrect.

Isovalerianate of manganese was obtained by digesting recently precipitated manganous oxide in an aqueous solution of isobutylformic acid at 26° C. ($= 78.8^{\circ}$ F.) for several hours, until the odor of the free acid had disappeared. The faint rose-red solution was filtered from excess of manganous oxide and evaporated in vacuo over sulphuric acid. Isovalerianate of manganese forms handsome, large, reddish, glistening, micaceous leaves, which are fatty to the touch, and have a composition corresponding to the formula $(C_6H_9O_2)_2Mn + 2H_2O$. It appears to lose water when kept over sulphuric acid.

Isovalerianate of copper was obtained as a green anhydrous precipitate by double decomposition between equivalents of the potassium or sodium salt and of sulphate of copper. The light-blue supernatant solution yielded by slow evaporation over sulphuric acid deep dark-green, cubical crystals of the same compound. The composition of isovalerianate of copper is $(C_6H_9O_2)_2Cu$. It is very sparingly soluble in water.

Isovalerianate of Quinia.—The conflicting results obtained by various experimenters with ordinary valerianate of quinia led

the authors to prepare and examine the isovalerianate of quinia. They obtained it by neutralizing an aqueous solution of the acid with a solution of quinia in alcohol, and evaporating the solution at a gentle temperature or over sulphuric acid. It was obtained in handsome octahedral crystals, which were *anhydrous*, and consequently had the composition corresponding to the formula $C_{20}H_{24}N_2O_7$, $C_5H_{10}O_2$. Operating in the same way with ordinary valerianic acid they also obtained an anhydrous salt. Prince Lucien Bonaparte had stated that the salt contained 2 atoms (old notation) of water to 1 atom each of quinia and valerianic acid; according to Wittstein the crystallized salt contains 1 atom valerianic acid, 2 atoms quinia, and 24 atoms of water (old notation).

Isovalerianate of Methyl.—This ether was readily obtained by passing dry hydrochloric acid into a solution of isobutylformic acid in absolute methyl-alcohol, heated to boiling in a water-bath. The ether is separated by water, washed with diluted soda solution, dried with chloride of calcium, and distilled; the greater part passing between 116° and 117° C. ($= 240.8^\circ$ and 242.6° F.). Its sp. gr. at 17° C. ($= 62.6^\circ$ F.) was found to be 0.885465. Its composition $= C_5H_9O_2$, CH_3 .

Isovalerianate of ethyl was obtained in the same manner. Its composition is $C_5H_9O_2$, C_2H_5 ; it boils at 134° – 135° C. ($= 273.2^\circ$ – 275° F.); and it had all the characters of the compound obtained previously by Frankland and Duppa.—Arch. f. Pharm., September, 1878, pp. 193 to 212.

Lactic and Butyric Acids—Occurrence and Preparation in the Wash-water of Starch.—Dr. George Thenius observes, that on evaporating the water from which the starch has been deposited in wheat starch factories, 100 parts of this water yield 1.04 per cent. of a thick brownish extract of a strong odor. During evaporation, insoluble nitrogenous bodies separate, which must be removed by filtration. 100 parts of this extract contain 87.1 per cent. lactic acid. This lactic acid may be used either for the preparation of ferrous lactate, or for the manufacture of butyric acid. A very good method of making *butyric acid* and

Butyric ether, is the following: Mix 40 grams blood fibrin, 60 grams crude lactic acid, 160 grams starch, 10 grams tartaric acid, and 2 or 3 liters of water; allow to stand 48 hours in a warm place, at about 104° to 113° F. As soon as butyric acid has been

formed, add 260 grams of powdered chalk, and allow to stand 5 or 6 weeks, repeatedly stirring. At the end of that time the mass will have become more fluid and clear. When no more gas-bubbles are given off, the butyrate of calcium is converted into the sodium salt by carbonate; the carbonate of calcium is removed by filtration, the filtrate evaporated, decomposed by sulphuric acid, the impure butyric acid again neutralized, decomposed by acid, and distilled. By mixing and warming 2 p. of butyric acid, 1 p. of sulphuric acid, and 2 p. of alcohol, butyric ether is obtained which, after the addition of water, floats upon the surface as an oily layer. This is washed with water, mixed with a little chalk, dehydrated by chloride of calcium, and finally distilled.—*New Rem.*, June, 1879, p. 177; from *Neueste Erfind. u. Erfahr.*, 1879, p. 180.

Lactic Fermentation.—L. Boutroux communicates some experiments on lactic fermentation made in continuation of some previous researches by Pasteur (1867), and carried out under the direction of the latter. A detailed description of the microscopical appearance of the lactic ferment is given. The cells are oval, having a breadth of .001 to .003 mm.; the length is about double this. These organisms develop rapidly when placed in mixtures containing sugar and some nitrogenous matter, such as whey, yeast-water, infusion of malt, or infusion of hay. Inverted sugar or glucose answer best for its growth. A certain amount of acid does not prevent the development of the ferment, although it slightly retards it. The liquor can attain an acidity of 1.5 gram of lactic acid per 100 cc. If chalk be added in such quantity that the acid becomes neutralized as it is formed, a much larger yield of lactic acid is obtained. If a vessel containing the sugar mixture is sown with the ferment, and the air is then exhausted or displaced by a current of carbonic anhydride free from dust, no fermentation takes place. The ferment is not killed, however, for on readmitting air, it again becomes active, and after two or three days forms a film on the surface. When a vessel containing a certain amount of air is sealed up, the growth takes place, but is soon stopped. In a closed flask with pure oxygen, it was found that this gas was entirely absorbed and replaced by carbonic anhydride, which occupied less than one-quarter the volume of the oxygen. The ferment produces only lactic acid; no alcohol or volatile acid is formed. When the action is completed, the film of the lactic ferment sinks to the bottom of the vessel, but re-

tains its vitality for many months. The formation of spores has not been proved; the cells are preserved without transformation. Besides in solutions of sugar, the ferment flourishes in a mixture of yeast-water and alcohol, with or without the addition of acetic acid, or in a mixture of yeast-water and glycol; but then special acids are produced. The author considers that the lactic ferment and *mycoderma aceti* are identical, but that their functions vary according to the composition of the mixture in which they grow.—Compt. Rend., 86, pp. 605–607; in J. Ch. Soc., July, 1878, p. 566.

Lactic Fermentation of Milk Sugar.—By his experiments, C. Richot has determined the following points regarding the lactic fermentation of milk sugar:

Milk which has been kept at a temperature of 40° C. (= 104° F.) becomes acid, coagulates, and finally attains an acidity equal to 1.6 gram of lactic acid per 100 of milk, which amount it never exceeds. Moreover, hydrochloric and sulphuric acids, when added in such quantity as to give the milk an acidity equal to 1 per cent. of lactic acid, prevent fermentation. But if, instead of a mineral acid, gastric juice is added, the casein is coagulated, and finally dissolved, and in less than twenty-four hours the milk contains a larger quantity of acid than it would otherwise have produced in a week. After four or five days an amount of acid, corresponding to 4 per cent. of lactic acid was found in the liquid. This large increase is probably due to the dissolved casein increasing the fermentation. When milk is coagulated with rennet and filtered, the whey never gives more than 1.6 per cent. of lactic acid, even after keeping for six months. The casein, free from lactose, ferments and produces lactic and butyric acids, besides other products of decomposition. If the albuminous substances in milk are coagulated, and it is then evaporated to dryness, and water added in such quantity as to make it up to the original volume, it will not undergo fermentation, even after the addition of pepsin. Whey ferments, although free from casein, because it contains nitrogenous substances in solution, lactoprotein, etc. A solution of pure lactose will not ferment, nor will a solution of casein in gastric juice; but if these two liquids are mixed, fermentation takes place. A current of oxygen passed through the mixture greatly assists this fermentation. Phenol added in excess entirely stops fermentation, but if it be added in insufficient quantity, lactic fermentation is only retarded, whereas butyric fermentation is quite checked; a circumstance which may, per-

haps, lead to the separation of these two ferments. The gastric juice of fish has a similar action to that of mammals, but it requires a temperature of 35° C. ($= 95^{\circ}$ F.) to coagulate the casein.—Compt. Rend., 86, pp. 550–552; in J. Chem. Soc., July, 1878, p. 567.

Benzoate of Sodium—Preparation and Therapeutic Value.—Professor Klebs, of Prague, has employed benzoate of sodium in febrile diseases of an infectious character, as well as in catarrh of the bladder and tuberculosis with success, and recommends it highly. While slower in its action than quinia sulphate or salicylate of sodium, its effects are more lasting, and are unaccompanied by unpleasant after-effects. It may be given in quantities up to 25 grams per diem; but 10 to 15 grams per day are usually sufficient.

The salt is prepared by melting benzoic acid in a small quantity of water by gentle heat, neutralizing with caustic soda, evaporating, and allowing to crystallize under a bell-glass over sulphuric acid.—Ph. Centralh., November 14th, 1878, p. 439.

Benzoate of Sodium—Preparation.—O. Schlickum recommends the preparation of benzoate of sodium as follows:

6 parts of benzoic acid and 7 parts of pure crystallized non-effloresced carbonate of sodium are triturated together in a mortar with some pressure; a doughy mass is formed with which a small quantity of alcohol is incorporated, and the whole is then set aside in a moderately warm place to become air dry. The salt has a slight acid reaction, which is preferred by the author. To obtain a neutral or slightly alkaline salt, $7\frac{1}{2}$ parts of the soda must be used. The yield being 8 parts, the author is of the opinion that its composition corresponds to the formula $\text{NaC}_7\text{H}_5\text{O}_2 + \text{H}_2\text{O}$. It is very difficult to obtain the salt in handsome crystals, on which account, and to avoid too long exposure to heat, the above method is recommended.

Benzoate of magnesium, if not desired in crystals, may be prepared by triturating 5 p. carbonate of magnesium and 12 p. benzoic acid with sufficient water to form a thick magma, then thinning the magma with a little alcohol, and adding calcined magnesia until litmus is no longer affected. The vessel is then placed in a warm current of air to dry. The salt is, however, readily crystallized by evaporating the filtered solution from the above quantities of material to 80 p, and setting aside in a cool

place; handsome needle-shaped crystals, which contain 3 mol. of water of crystallization. The yield of the above quantities is 18.5 parts; at 100°C . ($=212^{\circ}\text{F}$.), these 18.5 p. lose water and are reduced to 13 parts. Both the sodium and magnesium salts are very sparingly dissolved by strong alcohol, but readily in diluted alcohol and in water.—Schweiz. Wochenschr. f. Ph., March 14th, 1879, p. 91.

Benzoate of Iron (Ferrum Sub-benzoicum).—In view of the fact that benzoate of iron has recently been recommended as a remedy in scrofulous affections, and is given for this purpose in the form of troches with sugar, containing 0.1 to 0.2 gram, Dr. Hager gives the following method for its preparation: 100.0 p. of ammonia-water are diluted with 1500 p. of water; the solution is agitated with 37 p. of benzoic acid (prepared by the wet method) and 60 p. of diluted acetic acid of sp. gr. 1.040, or a sufficient quantity to produce a neutral solution. This solution is added to a mixture of 72 p. of solution of ferric chloride, sp. gr. 1.480, and 100 p. of distilled water; the precipitate is allowed to drain for a day, after washing with cold water, and is then dried by gentle heat. The yield is 60 to 62 parts, and the formula of the compound is $2\text{Fe}_2\text{O}_3, 3(\text{C}_6\text{H}_5\text{O}_2) + 15\text{H}_2\text{O}$.—Ph. Centralh., January 9th, 1879, p. 11.

Salicylic and Benzoic Acids—Solubility.—E. Bourgoïn finds for salicylic acid a higher degree of solubility in water than has been given by most authors, viz., that 1000 parts of water at 15°C . ($=59^{\circ}\text{F}$.) dissolve 2.25 parts, and at 100°C . ($=212^{\circ}\text{F}$.), 79.25 parts. Curves of solubilities for salicylic, and also for benzoic acid are given in the author's paper; they cross one another at a temperature of 40°C . ($=104^{\circ}\text{F}$.). Below that temperature salicylic acid is somewhat less soluble than benzoic acid, whilst above 40° it is more soluble.—Compt. Rend., 87, pp. 62–64; in J. Chem. Soc., November, 1878, p. 879.

Salicylic Acid, its Isomers and Homologues.—Professor H. Kolbe has patented, in Germany, the following methods for the artificial preparation of salicylic acid, its isomers and homologues:

First Method.—Phenol is heated with the solid hydrates of the alkalies or alkaline earths—sodium, potassium, calcium, barium or strontium hydrate—in a retort of iron, glass, or other suitable material. If, after the temperature has been maintained for some time at 183°C . ($=361.4^{\circ}\text{F}$.), and all the water, as well as a por-

tion of the phenol, have passed over, pure dry carbonic acid is passed continuously into the retort, the formation of salicylic acid or of paraoxybenzoic acid takes place with regularity. The temperature may towards the last exceed 200° C. ($= 392^{\circ}$ F.), the entire mass gradually becomes solid, and the operation is ended when but little phenol passes over.

Second Method (differing from the first only in the manipulation, but not in principle.)—A compound of the alkalies or alkaline earths, or of a mixture of the same, with phenol is prepared in an open vessel over a moderate fire. The mass, deprived as much as possible of moisture, is now introduced into the retort, and treated precisely like that obtained by the first method. In this manner the corresponding salt of salicylic acid, of paraoxybenzoic acid, or of a mixture of them are formed, while regenerated phenol collects in the receiver and may be again employed in a future operation.

Salicylic Acid from Oil of Wintergreen.—In 1875 (A. J. Ph., p. 343) Mr. J. U. Lloyd had mentioned that in preparing salicylic acid from wintergreen oil an oily liquid separated, and must be eliminated. He has since found that this applies only to impure oil, since the oily substance *is wanting when the oil is pure*. The author also incidentally remarks that pure oil of wintergreen can easily be obtained at present.

In a note to the above, the editor of A. J. Ph. states that oil of wintergreen is not unfrequently adulterated with oil of sassafras.—A. J. Ph., April, 1879, p. 183.

Salicylic Acid—Test for the Purity of the Acid and its Sodium Salt.—Dr. F. Von Heyden recommends the following tests, which, although they cannot show the presence of the secondary products found by Mr. John Williams (see Proceedings, 1878, p. 536) in most samples of artificial salicylic acid, are sufficient to detect most impurities due to imperfect preparation:

Test for Salicylic Acid.—Dissolve 3 to 5 grams of the acid in a test-tube in the smallest possible quantity of absolute alcohol, and pour the clear solution on a watch-glass placed over some white surface. Mechanical impurities will at once be found in the centre of the glass, and the microscope will easily show the nature of such impurities; then evaporate the alcohol in an atmosphere which is as free as possible from dust and iron, and the salicylic acid will crystallize out in fine efflorescences, which are to be subjected to the following observations:

1. If the points of the efflorescences are *brown*, the acid contains resinous impurities, and is to be condemned.

2. If the points are *light yellow*, and form a thick, melted appearance, the article tested is free from resin and carbolic acid, but not free from traces of organic dye. Such an article may be used for technical purposes, where the dye has no deleterious influence.

3. If the points are *violet* or *pink*, the preparation contains iron.

4. If the points are *clear* and *colorless*, the acid is pure. Salicylic acid crystals should always stand this test.

5. In browning the acid on a platinum dish, no incombustible ash must remain.

Tests for Salicylate of Sodium :

1. The dry salt—if preserved dry—must in no way change in appearance, color, or reaction.

2. The solution of this easily soluble salt must be bright and clear, and free from color and smell, and only a highly concentrated solution may show a slight yellow tint.

3. In carefully pouring water over it in a tumbler, no evolution of gas should be observed; if the latter take place, the article tested shows a mixture of bicarbonate or carbonate of sodium with salicylic acid, which, on being mixed with water, sets free carbonic acid gas. Such a mixture, however good in appearance, is much inferior to the normal chemical combination, and uncertain in composition.

4. Salicylate of sodium must be neutral, or, as it is sometimes wanted, have a weak acid reaction.

5. To further control the test mentioned under 3 a small quantity should be dissolved in pure muriatic acid, slowly adding a few drops of water; the salicylate will decompose without any emission of gas.

Regarding the test proposed by Hager with chemically pure, colorless sulphuric acid, if not handled with the greatest care it very easily gives rise to wrong conclusions.—Drug. Circ., September, 1878, p. 153.

Sodium Salicylate—Preparation.—Charles W. Drew observes that while the various processes for the preparation of salicylate of sodium, that have been published from time to time, may yield satisfactory products, the following one recommended by him

possesses manifest advantages over them. Pure crystallized salicylic acid (preferably of German manufacture), 1 part, is made into a paste with sufficient water in a glass or earthen vessel, and 1.04 parts of pure crystallized and uneffloresced sodium monocarbonate (obtained by simply recrystallizing the commercial article) are gradually added. Filter the solution (or strain) if necessary, heat to expel CO_2 , and test with test-paper, having first diluted a few drops of the solution considerably for this purpose. The solution should be very slightly acid; if alkaline the product will be more or less colored. Evaporate on a water-bath, with constant stirring, to dryness, avoiding more than a moderate heat, lest some of the acid be volatilized by the partial decomposition of the salt. The resulting salt is very nearly pure white, permanent, completely dissolved by nine-tenths its weight of water, at 60°F. ; in ten times its weight of 95 per cent. alcohol, at 60°F. ; and in seven parts of the same liquid at 120°F. Glycerin dissolves 50 per cent. of its weight at 180°F. , and retains this in solution at 60°F. For extemporaneous dispensing, the author, furthermore, recommends a solution of this salt, prepared as follows.

Take of salicylic acid, 1230 grains; sodium dicarbonate, 745 grains; water, q. s. for 6 fluid ounces. Each minim of the resulting solution contains 0.5 grain of sodium salicylate.—A. J. Ph., December, 1878, p. 569.

Salicylate of Zinc.—Hager states that this compound is used, applied medicinally, like sulphocarbolate of zinc. Two compounds exist, a neutral and basic salt. The *neutral salt* is very readily soluble in hot water, and crystallizes on cooling in handsome, long, silky, glistening needles, which have at first a sweet, followed by a bitter, metallic taste. It requires 20 parts of water at $20^\circ \text{C. (= } 68^\circ \text{F.)}$ for solution, is readily dissolved by alcohol, ether, methylic alcohol, very sparingly by hot bisulphide of carbon, and insoluble in oil of turpentine. It may be prepared by dissolving 10 parts of oxide of zinc in 50 parts of diluted acetic acid, adding 34 parts of salicylic acid and 100 parts of distilled water, boiling down the liquid until a pellicle forms, and allowing to crystallize. The crystals require recrystallization. Vigier gives the following simple formula: Crystallized salicylic acid is heated with distilled water in a porcelain capsule, and, without waiting for complete solution, oxide of zinc, suspended in water, is gradually added in slight excess. The liquid is boiled and filtered hot, when, upon cooling,

the salt will crystallize out, and is dried at a gentle heat. The *basic salt* is formed when a solution of the neutral salt is boiled, until the water present is insufficient to hold all the salt in solution, when it is deposited in the form of a white, very light powder. It is insoluble, and contains twice the quantity of zinc of the neutral salt.—Ph. Centralh., August 22d, 1878, p. 316.

Salicylates of Copper, Zinc, and Atropia.—Dr. Vulpius finds that the compounds which have acquired some application in the treatment of disease of the eye, possess, in many respects, quite unsatisfactory characters.

Salicylate of zinc, is very sparingly soluble in water, and though a 4 per cent. solution may be prepared, this must be regarded as supersaturated, since, upon standing, a portion of salicylate is again deposited. Moreover, the salt has a tendency, even in quite dilute solution, to form a very sparingly soluble basic compound, and hence such solutions also form deposits on standing. On the other hand, concentrated solutions of the compound can be obtained by taking advantage of its extreme solubility in alcohol. A 50 per cent. alcoholic solution may be diluted with three times its weight of water without depositing material quantities of the salt; but the solution is then no longer an aqueous one, and may be unsuitable for many of the purposes for which the salt is intended. Being a salt of one of the heavy metals, it is remarkable that it is also readily dissolved by ether.

Salicylate of copper shows even more unfavorable characters. A saturated aqueous solution does not exceed a strength of 2 per cent., and a boiling temperature must be carefully avoided, since the compound is readily decomposed. The aqueous solution also soon becomes turbid and forms a deposit. While the salt is readily dissolved by alcohol, such concentrated solution cannot be diluted with water without the immediate production of a precipitate. A solution of one part in five parts alcohol may be diluted with four times its weight of water; but such a solution, while comparatively weak, contains 20 per cent. of alcohol. Unlike salicylate of zinc, the copper compound is insoluble in ether, which, indeed, has the property of precipitating it from its aqueous solutions.

Salicylate of atropia differs widely from the two metallic salts in that it is not only extremely soluble in water, as well as in alcohol and in ether, but is also very hygroscopic; so much so, that it

forms a glassy mass after the vial containing it has been several times opened. This, of course, results in an increase of weight, and consequent variability in the strength, not to speak of the difficulty attending the weighing of such a substance. A remedy for this evil may be found in keeping the salt in the form of a concentrated solution of definite strength, or, perhaps better, to prepare the compound as wanted, from atropia and salicylic acid in stoichiometrical proportions.

The author concludes with the recommendation that the value of solution of the sulphates of the metallic oxides above named, in a one-fourth per cent. aqueous solution of salicylic acid, be tried as substitutes for the regular compounds with salicylic acid. Such solutions have kept perfectly for months.—Arch. f. Ph., March, 1879, p. 239–42.

Malic Acid—Artificial Production from Fumaric Acid.—F. Lloyd has obtained 60 parts of artificial malic acid by the following process from 100 parts of fumaric acid. A mixture of 1 part of fumaric acid, 4 parts of caustic soda, and 40 parts of water, is heated to 100° C. (= 212° F.) in a closed metallic vessel for 100 hours. When the reaction is complete, the quantity of sodium carbonate and hydrate in the product is determined by titration, and sufficient sulphuric acid is added to set free almost all the malic acid. After evaporating the mixture to dryness, and treating the residue with ether to dissolve out the fumaric and malic acids, the crystalline mass, which remains on distilling off the ether, is broken up and exposed to a moist atmosphere; the malic acid then deliquesces, and the fumaric acid remains undissolved. Artificial malic acid, purified by recrystallization, forms a hard white crust composed of microscopic crystals. It is deliquescent, but does not absorb water as rapidly as natural malic acid. It differs in its properties from natural optically active malic acid, also from Kekulé's optically inactive acid from monobromosuccinic acid, but it resembles in certain respects the acid which Pasteur obtained from optically inactive aspartic acid. Various salts of the artificial acid have been prepared by the author and described.—Liebig's Annalen, 192, pp. 80–89; in J. Ch. Soc., October, 1878, p. 784.

Chemically Pure Tartaric Acid—Preparation.—The ordinary methods of preparation do not yield an absolutely pure product. O. Ficinus proposes tartrate of zinc as most suitable for the prep-

aration of the chemically pure acid; this is completely decomposed by sulphhydric acid, and the precipitated sulphide is not oxidized in the liquid, as is the case with sulphide of lead. Moreover, tartrate of zinc being a sparingly soluble compound, it is readily obtained pure. The sulphide of zinc may be utilized for the generation of sulphhydric acid in the next operation, and the chloride of zinc formed is again used for the precipitation of tartrate of zinc. The following is the method of preparation: Crude tartar is saturated with carbonate of calcium; the tartrate of calcium formed may be converted into ordinary tartaric acid by decomposition with sulphuric acid, etc., or it may be converted into tartrate of zinc by digestion with chloride of zinc; the solution of tartrate of potassium is heated to boiling, decomposed with chloride of zinc; the precipitate thoroughly washed, suspended in water, and decomposed by sulphhydric acid. The filtrate from sulphide of zinc is heated for some time to 60° – 80° C. ($= 140^{\circ}$ – 176° F.) to remove excess of sulphhydric acid, filtered from the deposit of sulphur, and evaporated by gentle heat (best in vacuo) in porcelain vessels to crystallization.—Arch. f. Ph., April, 1879, p. 310.

Tartaric Acid—Determination in Dregs of Wine.—Professor Francesco Dotto-Scribani gives the following process, which serves for determining the effective quantity of tartaric acid, not merely in unadulterated, but even in the dregs of plastered wines. 10 grams of the dregs are reduced to a very fine powder and dried in the water-bath, and then moistened and made into a paste with pure hydrochloric acid in a porcelain capsule, and allowed to stand for twenty-four hours. The mass is then lixiviated with boiling distilled water, the liquid is filtered, and this treatment is repeated with the residue upon the filter till the liquid passing through no longer reddens litmus-paper. The filtrate is then boiled in a porcelain capsule, and whilst it is continually stirred with a glass spoon, milk of lime, obtained by levigation and passed through a strainer, is added little by little until the liquid begins to turn red litmus-paper blue. The capsule is then allowed to cool, and the contents are thrown upon a double filter, which has been previously well washed, and the precipitate is then washed, until on acidulating the washings with nitric acid and testing with nitrate of silver no turbidity is observed. The precipitate with the double filter is then dried in the water-bath and weighed, care being taken first to detach the outer from the inner filter, and

to place the former on the weight pan of the scale as a counterpoise for the inner filter. From the weight found is deduced the effective quantity of tartaric acid, 100 parts of tartrate of calcium containing 57.69 parts of tartaric acid.—Gazz. Chim. Ital., 1878, No. 10; in Ch. News, May 9th, 1879, p. 207.

Crude Tartar—Determination of Tartrate of Calcium.—A. Scheurer-Kestner gives a new method for determining tartrate of calcium in crude tartar, which it frequently contains. To determine the bitartrate of potassium, it is usual to titrate the hot solution with an alkaline solution. This method is unreliable, because the tartar frequently contains acid substances of a different nature. It is also recommended to determine the tartrate of calcium by precipitating the hydrochloric acid solution with solution of potassa or soda, but this is also liable to error if sulphate of calcium is present, since the latter is readily, by double decomposition with neutral tartrate of potassium formed, converted into tartrate of calcium. Again, it is recommended to reduce the tartar to carbonate by heating to redness, removing the carbonate of potassium by solution, and to determine the potassium compound as well as the insoluble portion volumetrically. The presence of gypsum in this instance also occasions erroneous results, because it converts a portion of the carbonate of potassium into sulphate. Inasmuch as crude tartars often contain gypsum it is therefore necessary to overcome the errors from this source. This is accomplished as follows: The tartar is dissolved in hydrochloric acid, filtered, neutralized with caustic soda, and precipitated by chloride of calcium. The tartaric acid is thus obtained completely united to calcic oxide. The precipitate is washed, heated to redness, and the tartaric acid calculated from the residue.—Ph. Centralh., August 22d, 1878, p. 320.

Tartrate and Oxalate of Iron—Pyrophoric Properties.—Professor R. Böttger communicates the following interesting observations: If one or the other of these salts is heated in a small glass flask, with a narrow neck, until the salt is completely decomposed, and the orifice is then dexterously closed with a cork, the intense black residue will be pyrophoric; it will strongly affect the magnetic needle, and if, when cold, it is poured out of the flask, it will ignite spontaneously, becoming oxidized to handsome red ferric oxide. The black mass resulting from the tartrate is composed of a mixture of finely divided carbon and ferrosiferrous oxide; that

from the oxalate only of the latter.—Ph. Centralh., January 16th, 1879, p. 17.

Citric Acid—New Reaction.—N. Laskowsky and Sabarin communicate a new reaction of citric acid, which is characteristic, and not interfered with by the presence of oxalic, tartaric, or malic acid, provided that at least 0.01 gram of citric acid is present. Itaconic acid, however, appears to vitiate the reaction. Citric acid with ammonia in excess (5 grams to 30 cc. 10 per cent. ammonia-water) is sealed in a tube, and heated for six hours to 120°C. ($= 248^{\circ}\text{F.}$); the liquid becomes yellow, and small crystals are deposited. When cool the liquid is poured into a porcelain capsule, when, after several hours, it assumes a blue color and the crystals disappear. After a few days the color changes to pale green, but still appears blue by transmitted light, and finally the liquid becomes colorless.

In the dark the formation of color is slower; in an atmosphere of carbonic acid, not at all. If the heat is continued for some time at 150°C. ($= 320^{\circ}\text{F.}$), or if 10 grams of the acid are used to 30 cc. ammonia-water, the formation of the green color is direct. If the heat is increased to 160°C. ($= 338^{\circ}\text{F.}$) the coloration does not appear at all.

To determine the presence of citric acid in fruit juices the following process is given: The juice is mixed with an equal volume of alcohol, filtered, precipitated with subacetate of lead, the precipitate washed, digested in ammonia-water, the solution heated to drive off excess of ammonia, treated with HS to remove lead, the filtrate precipitated with acetate of barium by the aid of heat, the barium precipitate washed, decomposed with sulphuric acid, and the solution evaporated to dryness. The dry mass is then heated with ammonia-water in a sealed tube, in the proportions above given.—Ph. Centralh., November 28th, 1878, p. 453.

Ammoniacal Citrates.—Ed. Landrin has by his experiments endeavored to decide whether the solution of metallic oxides in ammonium citrate is due to chemical combination, or whether the latter simply acts as a solvent. His results are in the affirmative as regards the oxides of magnesium, aluminium, iron, manganese, nickel, cobalt, and copper, but negative as regards the oxides of calcium, barium, and strontium. In these latter instances solutions may be effected at a boiling temperature; but on cooling a large proportion of the oxides is deposited in the form of basic

citrate, and free from ammonium, while the solution retains a portion of the oxide in solution. Upon further concentration more of the basic citrate is deposited until, finally, ammonium citrate alone remains in solution. The magnesium double compound—diammonium-magnesium citrate ($C_{12}H_{16}O_{11}$, $2NH_4O$, $MgO+2H_2O$)—is the type of all the other double compounds of the oxides above mentioned; these differing only in the quantity of water of crystallization. They are well defined, and crystalline in their structure.—Ph. Centralh., October 3d, 1878, p. 373.

Tannin—Determination—Particularly in Tea.—Dr. J. M. Eder reviews the various methods that have been proposed for the estimation of tannin, and has found none of them to respond to all the requirements. He recommends as reliable the following modification of Fleck's method, which he has used in determining the tannin in teas:

2 grams of tea are extracted 3 times successively with 100 cc. of water, boiling each time $\frac{1}{2}$ –1 hour; this secures all but about 0.2 per cent. of the tannin in the tea. The united liquids are filtered hot, then heated to near boiling, whereby any precipitate of tannate of iron is redissolved, and 20 to 30 cc. of solution of acetate of copper (1 p. crystallized acetate to 20–25 p. water) are then added. The flocculent brown precipitate of tannate of copper is collected on a filter and washed with hot water. The filtrate is green if sufficient cupric acetate has been used. The precipitate is then dried, burnt in a porcelain crucible, the residue moistened with nitric acid, again heated to redness, and weighed as cupric oxide. The weight found, multiplied by 1.306, gives the weight of the tannin. A somewhat more accurate modification (preventing loss by spitting when adding nitric acid) consists in heating the ash to redness with sulphur in a current of hydrogen, using a Rose's crucible, and multiplying the weight of the sulphide of copper obtained by the same numbers (1.306).

By the method of Allen good results, but always somewhat too low, have also been obtained by the author when the process is conducted as follows: A solution of 1 gram acetate of lead in 1 liter of water is adjusted to a solution of pure tannin prepared in the same proportions. After each addition of the test solution a drop of the mixture is filtered on a porcelain plate and brought in contact with a solution of ferrocyanide of potassium in equal volumes of ammonia and water. When the drop of liquid be-

comes no longer colored by the ferrocyanide the process is ended.—Schweiz. Wochenschr. f. Ph., October 11th, 1878, p. 362.

Gallic, Tannic, and Pyrogallic Acids—Distinction.—Mr. William Watson communicates the following method to distinguish between these acids:

To about $\frac{1}{2}$ grain of the acid in a little water add NH_4HO .

Gallic.	Tannic.	Pyrogallic.
Pink, rapidly changing to deep-orange solution.	Same as gallic.	Lemon-colored solution.

To each ammoniacal solution add HNO_3 .

Gallic.	Tannic.	Pyrogallic.
Red.	Purple precipitate insoluble in excess.	Red.

Substituting HCl for HNO_3 .

Gallic.	Tannic.	Pyrogallic.
Red.	Pink precipitate soluble in excess.	Pink, quickly changing to red.

—Ph. J. Trans., July 20th, 1878, p. 46.

Pyrogallic Acid—Medicinal Uses.—Professor Th. Husemann communicates to "Pharm. Zeitung" (No. 27, 1879) that pyrogallic acid possesses excellent medicinal qualities, which seem to insure its introduction into medicine. He states that Hebra has obtained excellent results by its external application in *psoriasis*. A. Vesey has given it internally with marked results as a hæmstatic agent in bleeding from the lungs and stomach in doses of 0.05 gram. The effects of the remedy were found to be as certain as those of ergot, iron, tannin, or gallic acid, never causing nausea and vomiting like ergot, nor the disturbances of the stomach usually observed with the other remedies. He observes that tannin is changed when taken internally into gallic, pyrogallic, metagallic acid, etc., and that gallic acid, etc., are better tolerated by the stomach than tannin.—Ph. Centralh., March 8th, 1879, p. 190.

Chrysophanic Acid.—Mr. J. Laker Macmillan reviews the history and chemical characters of "araroba" (Goa-powder) and chrysophanic acid,—the latter in its relation not only to "ara-

roba" but also to the other vegetable substances in which it was previously known to be contained,—much of which has been furnished in previous reports. The following relating to chrysophanic acid as at present found in the English market may properly find place here. It is in the form of a light powder of a turmeric-yellow tint, sp. gr. (approximate) 0.847. It is soluble in benzol, chloroform, turpentine, and in the fixed and volatile oils to a large extent, sparingly soluble in ether and alcohol, and insoluble in water, glycerin, and solid paraffin. It is dissolved by sulphuric and nitric acid,—in the latter to a less extent,—by caustic potash and by ammonia; fuses at 123.3°C. ($= 254^{\circ}\text{F.}$), and boils at 232°C. ($= 449.6^{\circ}\text{F.}$). At the latter temperature it is decomposed into a dark-green resinous-like substance, which is largely soluble in ether. Ol. jecoris dissolves twice its weight of the acid, yielding a mixture containing 70 per cent. Ol. olivæ, ol. pini sylvest., creasotum, ol. terebinth., ol. lavandul., and vaseline dissolve readily their own weight of acid, yielding mixtures containing 52 per cent. Taking advantage of its solubility in the fixed oils, a considerable saving may be effected in preparing ointments direct from araroba. Ol. olivæ thoroughly exhausts that substance, yielding the acid after removal of the oil by ether in a state of purity. The Cingalese doctors take advantage of this fact and fry the leaves of the *Cassia alata*, *C. tora*, *C. occidentalis*,—called by them "Penni tora," and *C. sophora*, called "Ooroo tora,"—in gingely oil, and in castor oil, and use the strained product as an ointment for ringworm, itch, and other skin diseases.

The solutions of the acid in potassa or ammonia are capable of yielding beautiful lakes, the latter pink, the former subdued purple. All shades and tints of the common and rarer seaweeds can be obtained, and the acid therefore may find useful application in other directions than that in which it is at present applied.—Ph. J. Trans., March 15th, 1879, pp. 755–757.

Chrysarobin—Presence in Goa-powder instead of Chrysophanic Acid.—The alleged presence of 80 to 84 per cent. of chrysophanic acid in Goa-powder observed by Professor Attfield (see Proceedings, 1875, p. 213) led C. Liebermann and P. Seidler to a renewed examination of the drug, the more so since they considered that Attfield's identification of chrysophanic acid left much to be desired, and the possibility of the substance before him belonging only to the same group was not excluded. Goa-powder, obtained from

Messrs. Gehe, of Dresden, was treated in an extraction apparatus with boiling benzol. The residue amounted to 17.5 per cent. of woody fibre. The greater part of the dissolved organic substance (about two-thirds of the weight of the powder used) separated from the benzol as a pale-yellow wart-like crystalline powder, whilst about 10 per cent. of the same substance, but less pure, remained in solution. By evaporation of the benzol this portion also could be recovered. The greater quantity of this substance, about 250 grams, was easily purified by repeated crystallization from glacial acetic acid, and then formed small yellow laminæ, which were insoluble in water and ammonia, but dissolved in not too dilute solution of caustic alkali with a yellow color and green fluorescence. The authors have analyzed this substance, which they are satisfied is the same substance as that which Attfield had analyzed, and give their reasons for believing that the substance originally contained in Goa-powder is not chrysophanic acid, and that the chrysophanic acid obtained by Attfield was an altered product, first yielded by the pre-existing compound during his last process of purification. To the substance originally formed in Goa-powder the authors propose to give the name of *chrysarobin*,* and their opinion as to its chemical individuality is based not only upon their obtaining almost the same figures as Attfield for the purified product with potash, but also on the fact that its composition was not essentially altered after repeated crystallizations. The following figures show the results obtained with different preparations and crystallizations :

	Attfield.	Liebermann and Seldler found.			Calculated ($C_{30}H_{26}O_7$).
C,	72.73	72.86	72.46	72.88	72.29
H,	5.28	5.60	5.86	4.86	5.22

These analyses correspond with the formula $C_{30}H_{26}O_7$. The authors conclude definitely that chrysarobin, like chrysophanic acid, is a derivative of methylantracene, basing their conclusion upon the thorough examination of a hydrocarbon, agreeing in every respect with that substance, obtained by the ignition

* Mr. David Kemp (see Proceedings, 1875, p. 213) has already proposed the name "chrysarobin" for Goa-powder itself, and this name appears to have become current to some extent for that powder in English literature.—REP.

of chrysarobin with zinc dust. The following characters distinguish the two substances: Chrysarobin dissolves in concentrated sulphuric acid with a yellow color, and chrysophanic acid with a red color. Chrysophanic acid dissolves in very dilute potash solution with a red color, while chrysarobin remains undissolved in it, but in a stronger potash solution dissolves with a yellow color with strong green fluorescence. Fused with potash chrysophanic acid gives a blue mass, while chrysarobin forms a brown one. When alkaline solution of chrysarobin is shaken with air the yellow color passes rapidly into the red of chrysophanic acid. This last reaction the authors look upon as the key to the nature of chrysarobin as well as to the varying results obtained by Attfield, the oxidation product so obtained being chrysophanic acid.

Chrysophanic acid may be prepared from *chrysarobin* by pouring rather dilute potash lye over the latter in a large retort, and then passing a stream of air over the liquor, shaking so as to renew the surface, until all the chrysarobin is dissolved, and the liquor has acquired uniformly the red color of an alkaline solution of chrysophanic acid. A much more prolonged action is not desirable for the obtaining of a pure product. The alkaline solution is precipitated by an acid, the precipitate washed, dried, and treated in an extraction apparatus with petroleum spirit, from which the substance crystallizes in beautiful yellow laminae. When benzol is used a quantity of a dirty-brown product passes at the same time into solution and hinders the purification. The substance so obtained has lost the distinguishing characters of chrysarobin and resembles chrysophanic acid in every respect. Upon analysis the acid so obtained gave the following percentage results:

		Dried at 125° C.	Sublimed.	Calculated for $C_{14}H_{10}O_4$.
C,	. . . . .	69.50	70.19	70.87
H,	. . . . .	4.22	4.21	8.94

Thus the unsublimed substance gave the same figures as those found by Attfield, and also as those obtained by one of the authors with chrysophanic acid from rhubarb when it was used unsublimed. In this way, therefore, a larger supply of pure chrysophanic acid can be obtained than hitherto at a more moderate

price. The conversion of chrysarobin, based upon the formulas adopted in the above, is explained by the following equation:



—Ph. J. Trans., May 3d, 1879, p. 896; from Ber. d. d. Ch. Ges., xi, p. 1603.

Cryptophanic Acid.—This acid ($\text{C}_5\text{H}_9\text{NO}_5$), which W. Thudichum discovered in urine in 1865, and which has usually been enumerated as one of the coloring matters of urine, is now stated to be a normal constituent of urine (Pflüger's Archiv, xv (?)). It is obtained by treating the fresh urine with milk of lime, filtering, evaporating the filtrate, acidulating with acetic acid, and setting aside. The crystals deposited are removed, the syrupy liquid is mixed with 90 per cent. alcohol, and the precipitate occasioned thereby is washed with alcohol, dissolved in water, and again precipitated by alcohol. This final precipitate is composed of the cryptophanates of calcium and the alkalies. The cryptophanates give a brown precipitate with ferric chloride. Cryptophanic acid forms an amorphous, gumlike mass, which is soluble in water, sparingly soluble in alcohol, and very difficultly so in ether. It is precipitated from its aqueous solutions by mercuric nitrate.—Ph. Centralb., May 8th, 1879, p. 187; from Pflüger's Archiv, xv (?).

Polyporic Acid.—In a previous communication (see Proceedings, 1878, p. 177) C. Stahlschmidt has shown that polyporic acid, obtained from the fungus *Polyporus purpurascens*, dissolves in alkalies, forming a purple solution, and that the purple color is destroyed by boiling. On the addition of dilute sulphuric acid to the colorless liquid a precipitate is thrown down, which consists of a mixture of hydropolyporic acid and a substance having the composition $\text{C}_{10}\text{H}_8\text{O}$. The latter compound is insoluble in water, but dissolves in alcohol, the alcoholic solution having an acid reaction. It melts at 156°C . ($= 312.8^\circ \text{F}$).

Hydropolyporic acid ($\text{C}_9\text{H}_8\text{O}$) crystallizes in colorless needles that melt at 162°C . ($= 323^\circ \text{F}$), and are soluble in water and alcohol. The sodium salt forms colorless prisms, which effloresce on exposure to the air. The barium salt crystallizes in quadratic plates, which are sparingly soluble in water. The manganese, copper, cobalt, silver, and lead salts are obtained as precipitates.

By the action of strong nitric acid on polyporic acid, *nitropoly-*

poric and *benzoic acids* and a small quantity of *picric acid* are formed. Nitropolyporic acid melts at 230°C. ($= 446^{\circ}\text{F.}$), and is soluble in alcohol and in water. By adding chlorate of potassium to a boiling mixture of polyporic and hydrochloric acids three chlorinated compounds are obtained, two of which are insoluble in water, but dissolve in alcohol.—Liebig's *Annalen*, 195, 365–372; in *J. Ch. Soc.*, May, 1878, p. 382.

ORGANIC BASES.

Alkaloids—Application of Oleic Acid to their Isolation.—In a paper on “Oleic Acid and their Oleates” (see Oleic Acid in this Report), Mr. L. Wolff draws attention to an important application of oleic acid: the separation of the alkaloids from their contaminants. The experiments made are yet too incomplete to justify definite conclusions as to the value of the application, but theoretically, there appears no reason why the process should not prove very valuable, and it certainly merits attention. The method, as applied to pilocarpia from jaborandi leaves, is as follows: The acid percolate from the leaves, deprived of its resin, is treated with a solution of caustic potassa or soda to saturation, causing a precipitate of the impure alkaloid; the precipitate is filtered off, washed and dried, and then treated with oleic acid, which readily takes up the pure alkaloid, rejecting the extractive matter. The oleic acid solution is then diluted with benzin, in which the alkaloid oleate is soluble; the filtered mixture, shaken with water slightly acidulated with hydrochloric acid, decomposes the soap formed, and takes up the alkaloid, which is again precipitated from it by ammonia, and can then be directly converted into the salt desired. The oleic acid can be used again for the same or other purposes.—*A. J. Ph.*, January, 1879, p. 10.

Alkaloids—Separation.—The method proposed by Stas, and commonly used at the present day, of shaking the aqueous alkaline or, in some cases, acid solution of the alkaloid, with volatile liquids which do not permanently mix with water, is, in some cases, rather troublesome, in consequence of the slowness with which the different layers separate. Mr. E. Heintz recommends a modification of the process, which does away with this drawback, and permits rapid and complete exhaustion of the material. He uses white bole, which has been repeatedly boiled with very dilute chemically pure hydrochloric acid, and afterwards freed

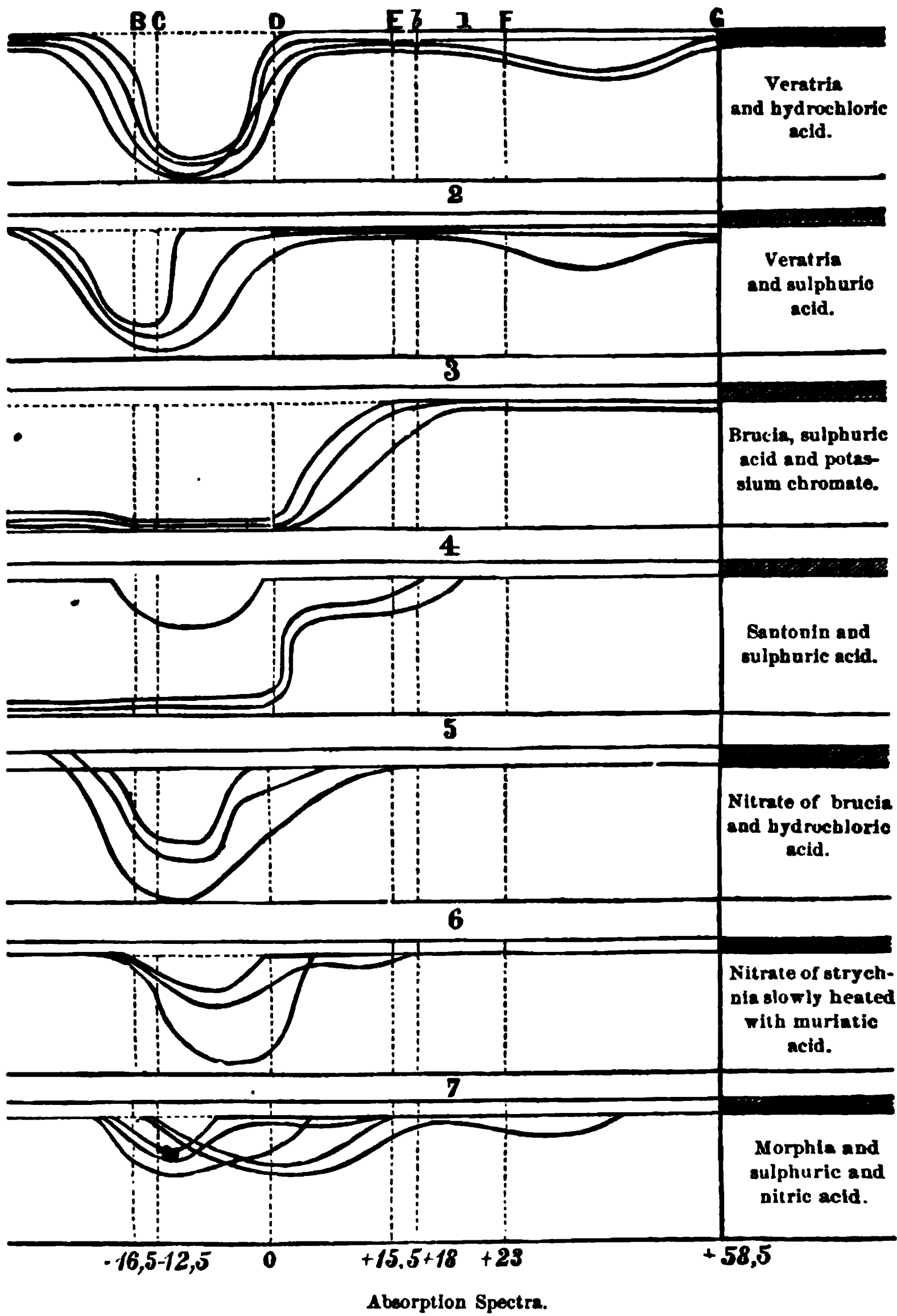
from acid. This bole is to be added to the liquid to be examined for alkaloids, the whole to be rapidly dried on a water-bath, for which purpose a very gentle heat, but constant agitation is required, and the dry residue to be powdered. This may then be treated with the solvent. The powder being quite heavy, it settles rapidly, when the liquid may be poured through a filter, the powder transferred to the latter, and washed with the solvent until exhausted.—*New Rem.*, July, 1878, p. 200; from *Zeitschr. f. Anal. Ch.*, 1878.

The editor of "*New Rem.*" observes that the above method has long been used by him for the same purpose; only, instead of white bole, he uses pure quartz sand, and exhausts the material in a displacement apparatus.—*Ibid.*

Absorption Spectra of Solution of Brucia, Morphia, Strychnia, Veratria, and Santonin.—The observation of Professor Flückiger that nitrate of strychnia, similarly to veratria, gives a red color when heated with concentrated hydrochloric acid, has induced Mr. Arthur Meyer to compare the absorption spectra of the red liquids formed, and incidentally also, the absorption spectra of liquids resulting from similar reactions upon other alkaloids, and upon santonin. The results are shown in the accompanying illustrations, which will be understood by the following explanation:

The field situated above the curve represents the unabsorbed light of the spectrum; the absorption in the various parts is estimated by comparison with the complete spectrum, and not by absolute measurements; the situation of the sun-lines is still more accurately indicated by the distances (D corresponding to O) which are placed beneath the spectra. The solutions are prepared by producing the reaction of a maximum quantity of substance with a minimum quantity of reagent, and these were then diluted with sulphuric or hydrochloric acid to produce the various concentrations. The designations "upper," "second," etc., have reference to the curve ends of the lines on the left of the drawings. In 7 the counting is commenced at the lines farthest to the left, the curves 4 and 5 being those situated farthest to the right.

FIG. 53.



1. *Veratria and hydrochloric acid*, sp. gr. 1.12, heated and examined after cooling:

Upper, <i>a</i> , 0.01 veratria and 1 cc. hydrochloric acid.	} Thickness of the layers = 15 mm.
Second, <i>b</i> , 0.01 " 2 cc. "	
Third, <i>c</i> , 0.01 " 4 cc. "	
Fourth, <i>d</i> , 0.01 " 6 cc. "	

2. *Veratria and concentrated sulphuric acid*, sp. gr. 1.84, heated and examined after cooling:

Upper, <i>a</i> , 0.05 veratria and 4 cc. sulph. acid.	} Thickness of the layers = 15 mm.
Second, <i>b</i> , 0.05 " 15 cc. "	
Third, <i>c</i> , 0.00005 " 1 cc. "	

3. *Brucia* dissolved in *diluted sulphuric acid*, sp. gr. 1.11, and a trace of chromate of potassium solution added:

Upper, <i>a</i> , 0.01 brucia and 1 cc. sulph. acid.	} Thickness of the layers = 15 mm.
Second, <i>b</i> , 0.01 " 2 cc. "	
Third, <i>c</i> , 0.01 " 4 cc. "	

4. *Santonin with conc. sulphuric acid*, sp. gr. 1.84, heated slowly until appearance of red color.

Upper, <i>a</i> , 0.01 santonin and 15 cc. sulph. acid.	} Thickness of the layers = 15 mm.
Second, <i>b</i> , 0.01 " 40 cc. "	
Third, <i>c</i> , 0.01 " 5 cc. "	

5. *Nitrate of brucia and hydrochloric acid*, sp. gr. 1.12, boiled until red and then examined:

Upper, <i>a</i> , 0.01 nitrate of brucia and 2 cc. hydrochloric acid.	} Thickness of the layers = 15 mm.
Second, <i>b</i> , 0.01 " " 4 cc. "	
Third, <i>c</i> , 0.01 " " 10 cc. "	

6. *Nitrate of strychnia and hydrochloric acid*, sp. gr. 1.14, heated slowly at first, then more strongly, and finally to boiling, and then kept boiling for some time; examined during the transformations:

Third, <i>a</i> , 0.05 nitrate of strychnia and 5 cc. hydrochloric acid.	} Thickness of layers = 15 mm.
Upper, <i>b</i> , 0.05 " " 5 cc. "	
Second, <i>c</i> , 0.05 " " 5 cc. "	

7. *Morphia and sulphuric acid*, sp. gr. 1.44, heated; *a*, examined while hot; *b*, while cold:

Fourth, *a*, 0.01 morphia and 8 cc. sulph. acid. Thickness of layer = 18 mm.
 Fifth, *b*, 0.01 " 8 cc. " " " 15 mm.

Morphia and sulphuric acid, heated, cooled, and a trace of nitric acid added:

Upper, <i>c</i> , 0.01 morphia and 8 cc. sulph. acid.	} Thickness of the layers = 15 mm.
Second, <i>d</i> , 0.01 " 50 cc. "	
Third, <i>e</i> , 0.01 " 100 cc. "	

The *veratria* reactions with hydrochloric and sulphuric acids show, as will be seen by the curves *d* and *c* in 1 and 2, the same absorption; but, corresponding to the intensity of color, the spectrum obtained with 0.0002 *veratria* and 6 cc. sulphuric acid is equal to that obtained with 0.01 *veratria* and 6 cc. hydrochloric acid. The presence of the absorption band between *D* and *F* is characteristic for *veratria*.

Nitrate of strychnia gives with hydrochloric acid a color reaction from yellow to red and orange. When it is slowly heated the absorption "6, curve *a*" is first shown, the liquid being light yellow. Upon further heating, the absorption rapidly advances, and the line "6, curve *b*" is formed. This line, however, continues to extend until finally "6, curve *c*" is formed.

Nitrate of brucia gives similar results; the production of the red color, however, requires longer boiling, and when sufficiently boiled the solutions of *brucia* and *strychnia*, when of the same strength, cannot be distinguished.

Santonin gives with sulphuric acid an absorption running towards the violet rays of the spectrum, which is found as a dark line immediately over the sodium line.

The green solution of *morphia* in hot sulphuric acid which transmits the red rays, absorbs very strongly after the addition of a trace of nitric acid, and upon dilution transmits more yellow and violet, and acquires a handsome red color.—Arch. f. Pharm., November, 1878, pp. 413–416.

Subliming-Points of Alkaloids and other Proximate Principles.—Mr. A. Wynter Blyth has repeated some of the experiments made by Helwig, Dr. Guy, and others, on the subliming-points of certain proximate principles. After pointing out some of the defects of the apparatus, processes, etc., employed, the author describes the method and apparatus used by him, the latter being

a modification of Dr. Guy's. He defines a sublimate to be: "The most minute films, dots, or crystals which can be observed by a quarter-inch power, and which are obtained by keeping the subliming-cell at a definite temperature for 60 seconds." The alkaloids, etc., that were subjected to this test were the following: Morphia, thebaia, narcotia, narceia, papaverina, hyoscyamia, atropia (daturia), solania, strychnia, brucia, saponin, delphinin, pilocarpia, theina, theobromia, salicin, picrotoxin, cantharidin, quinetum, quinidia. As a result he finds that the active principles of plants may, in regard to their behavior to heat, be classed for practical purposes into:

1. Those which give a decided crystalline sublimate:
 - a. Below 100° C.: theina, thebaia, cantharidin.
 - b. Between 100° and 150° C.: quinetum.
 - c. Between 150° and 200° C.: strychnia, morphia, pilocarpia.
2. Those which melt but give no sublimate:
 - a. Below 100° C.: hyoscyamia, atropia.
 - b. Between 100° and 150° C.: papaverina.
 - c. Between 150° and 200° C.: salicin.
 - d. Above 200° C.: solania.
3. Those which neither melt nor give a crystalline sublimate, e. g., saponin.—J. Chem. Soc., August, 1878, pp. 313–318.

Morphia—Means of Extraction and Recognition in Cases of Poison.—Professor Selmi observes that in the detection of morphia in the viscera, ether dissolves a little of this alkaloid if the alkaline liquid is left in contact for twenty-four hours with the ether. If the viscera are recent, morphia may be detected with certainty. Chloroform in the cold does not dissolve the morphia contained in the viscera. This solvent may be employed to separate a part of the cadaveric alkaloids and some other impurities. A portion of the morphia present in the viscera is decomposed during the operation. Purification with basic acetate of lead and sulphuretted hydrogen is useful for decolorizing the aqueous extract, but the precipitate of sulphide of lead may retain a portion of the dissolved alkaloid. An amylic solution of tartaric acid may serve to remove certain cadaveric alkaloids accompanying morphia. In the putrid viscera the morphia is decomposed, and seems to be replaced by a derivative which possesses certain of its reactions, but which is deprived of the most characteristic. The detection of a derivative of morphia ought not to be considered satisfactory proof that the viscera contained the base. Half a

milligram of morphia, dissolved in four to five drops of sulphuric acid, yields, on the application of heat, a violet liquid. When cold this solution gives the following reactions: If saturated with bicarbonate of sodium, nothing; but on adding a drop of tincture of iodine, a green color. With a drop of chlorine-water the violet passes to a cherry-red, which becomes green on neutralizing with bicarbonate of sodium. With a drop of solution of tetrachloride of lead, a cherry-red coloration, more intense than that produced with chlorine-water, and also turning green with bicarbonate of sodium. With bromine-water the violet becomes almost blood-red, which turns to an intense green on saturation with bicarbonate of sodium. With iodic acid the violet is intensified. With nitric acid the cherry-red first produced becomes yellow, and on saturation with ammonia turns to a brown. Red prussiate gives a fine cherry-red coloration, as does also sulphate of bin oxide of manganese if the solution is diluted.—*Mon. Scient. Quesn.*, August, 1878; in *Chem. News*, September 13th, 1878, p. 140.

Morphia—Estimation.—Mr. George D. Hays, after trying a number of the methods proposed for the determination of morphia in opium, has found a modification of Dr. Gregory's method to give the most satisfactory results: The infusion of opium was mixed with a solution of chloride of calcium, and evaporated cautiously to the consistence of a soft extract. This was triturated with water, thrown upon a filter, and the meconate of calcium, thus rendered insoluble, well washed, the washings being added to the filtrate. The solution of muriate of morphia thus obtained was decolorized with animal charcoal, filtered, and the charcoal well washed with hot water. The filtrate was then evaporated to a small bulk, water of ammonia added to it in the slightest possible excess, and the whole allowed to stand twenty-four hours, the morphia then separating in clear crystals. The morphia was collected on a carefully dried and weighed filter, washed with cold water, and dried by means of a hot-air bath until it ceased to lose weight. This process, applied to nine samples of powdered opium, gave the following percentages of morphia: 15.72, 15.41, 14.16, 13.34, 12.39, 12.08, 10.83, 8.95, and 5.20.—*New Rem.*, July, 1878, p. 193.

Morphia—New Reaction.—Mr. David Lindo has observed that neutral solutions of morphia give, with ammoniacal solutions of

copper, an intense green color; and, inasmuch as the reaction may be of some value for confirmatory purposes, gives the following directions for making the solution and for its application: Dissolve 1 part of crystallized sulphate of copper in 10 parts of water; add solution of ammonia cautiously and with active stirring until the precipitate is just dissolved. To ascertain if this solution is fit for the intended purpose, dissolve 2 grains of muriate of morphia in 1 ounce of distilled water; place some of this in a test-tube, add a few drops of the test fluid, and shake the vessel slightly. If a precipitate or permanent turbidity is observed, the test fluid requires a little more ammonia, which should be added in small quantity at a time, and the mixture well shaken after each addition, as a notable excess prevents the test from acting. When a few drops of a properly prepared test fluid are added to a neutral solution of a morphia salt, and the tube is slightly shaken, there is no cloudiness produced, but the fluid assumes a magnificent emerald-green color. Phenol is the only other colorless organic compound, within the author's knowledge, that will afford a similar color with the test.—Chem. News, August 9th, 1878, p. 65.

Morphia—Value of the Iodic Acid, Sulphomolybdic Acid, and Ferric Chloride Tests.—Mr. David Brown has compared the action of the reactions of iodic acid, of sulphomolybdic acid, and of ferric chloride with morphia, with the reactions produced by the same reagents in grape-juice, orange-juice, saliva, and orange-juice and saliva, with the results given below:

Action of Iodic Acid and Starch:

1. *On Morphia:* $\frac{1}{2000}$ grain of muriate in a drop of water, a little starch paste, and a particle of iodic acid—blue color instantly developed, and soon disappears.

2. *On Grape-juice:* A few drops of freshly expressed juice, treated the same way, no color after three hours; a quantity of juice evaporated to dryness at the ordinary temperature over sulphuric acid, the residue gave negative results; the dry alcoholic extract, treated in the same way, gave at once a dirty-blue color, which gradually disappeared; the ethereal extract, prepared by Stas's process, gave negative results.

3. *On Orange-juice:* The fresh juice as well as the dried juice gave a blue color instantly; the alcoholic extract gave no definite reaction, and the ethereal extract gave negative results.

4. *On Saliva:* Bright blue, with moist or dry saliva; when the

saliva is mixed with acetate of lead, and the lead removed by sulphuretted hydrogen, the reaction is much less distinct.

5. *On Saliva and Orange-juice*: A violet color is immediately produced; differs from the reaction with morphia, however, in being permanently so, not changing to blue.

Action of Sulphomolybdic Acid:

1. *On Morphia*: $\frac{1}{2000}$ grain muriate of morphia, 1 drop sulphomolybdic acid, an immediate rich purple, rapidly disappearing, passing through a brown tint to blue, during 15 minutes, and becoming colorless in half an hour. The reaction is the same if varying proportions, or if free morphia is used. Water interferes with and may altogether prevent the reaction.

2. *On Grape-juice*: Very faint color after the lapse of nearly a half hour, and then quickly disappearing; with dried juice, practically the same; the alcoholic extract gave varying results, the color being of an obscure, dirty shade, with a trace of blue, and requiring from 5 to 10 minutes. Stas's ethereal extract gave an evanescent reddish tint, which, except in a single instance, failed to change to blue. This change is probably due to alcohol, the least trace, since that liquid reduces the molybdic acid.

3. *On Orange-juice*: Fresh juice, no coloration; dried juice, a faint blue in from 10 to 15 minutes; ethereal extract, no coloration.

4. *On Saliva*: No color with natural saliva; when evaporated to dryness, a slight blue color after 30 minutes.

5. *On Saliva and Orange-juice*: No blue color until after half an hour, and then not distinct; evaporated to dryness, an indistinct color in 20 minutes, becoming more decided after some time longer.

Action of Ferric Chloride:

1. *On Morphia*: A bluish-green, even with $\frac{1}{2000}$ grain.

2. *On Meconic Acid*: wine-red tint, perceptible with $\frac{1}{12000}$ grain, which is about the limit of the reaction. With $\frac{1}{2000}$ grain very distinct.

3. *On Saliva*: Slight orange-red tint, with either natural or dried saliva; not mistakable for the wine-red color of meconate of iron.

4. *On Orange-juice and Saliva*: Orange color, with either moist or dry saliva.

5. *On Vinegar*: White, brown, and French vinegar all failed to

produce a red coloration ; their residues of evaporation also gave negative results.—Ph. J. Trans., July 27th, 1878, p. 70.

Apomorphia.—E. Merck draws attention to an error in the "Additamentis" to the Pharm. Austriaca, vi, into which apomorphia has been introduced. It is there stated that the hydrochlorate is soluble in ether and in chloroform. This is true of the alkaloid but not of the salt, and the insolubility of the latter in these solvents is really an indication of purity. Mr. Merck thinks it likely that the statement of Mathiesen and Wright (Pharm. Jour. and Trans., 2 ser., x, 682, and xi, 40), that hydrochlorate of apomorphia readily absorbs oxygen when exposed to moist air, forms a green product, and is then soluble in ether, with a rose-red, and in chloroform with a violet color, has given rise to the error named. A preparation that communicates color to chloroform should be rejected.—Zeitschr. Oest. Ap. Ver., February 10th, 1879, p. 65.

Gnoscopia.—*A New Opium Alkaloid*.—Messrs. T. and H. Smith have repeatedly met with a crystalline body in the mother liquors from the purification of narceia, which, distinguished at first from the principles more generally met with in opium by its melting-point and its slight solubility in spirit, was, upon closer examination, ascertained to be a hitherto unknown alkaloid, and named by the authors *gnoscopia*. It forms readily crystallizable salts, having an acid reaction, and this reaction, as well as its insolubility in water and alkalies, mark the strong resemblance of the new alkaloid to the papaverin group. Hence, also, it is easily separated from narceia, which is moderately soluble in boiling water, and freely so in alkalies.

Gnoscopia when pure (after being repeatedly crystallized from boiling spirits) forms long, thin, white needles, having a woolly character when dried. Soluble in 1500 p. cold spirit; melts at 233° C. (=451.4° F.) with decomposition; its muriate crystallizes in glassy prisms, apparently containing water of crystallization, which is lost at a moderate heat. The solutions of this salt give a buff-colored crystalline precipitate with platino-chloride of potassium, and a white precipitate with potassio-mercuric iodide. The alkaloid is insoluble in aqueous or in spirituous solutions of caustic soda, in mineral spirit, and in fusel oil; it is dissolved by chloroform and bisulphide of carbon, and slightly soluble in benzol. Sulphuric acid dissolves it with a slightly yellow color, which be-

comes at once carmine-red on the addition of a trace of nitric acid, and remains so. In this respect it differs from rhœadina, which assumes this red color by the addition of either sulphuric or hydrochloric acid alone. The analysis of gnoscopia leads to the formula $C_{24}H_{36}N_2O_{11}$.—Ph. J. Trans., August 3d, 1878, p. 82.

Cinchona Alkaloids—Microscopic Reaction with Sulphocyanide of Potassium.—F. Schrage has repeated his experiments upon the microscopic reaction of sulphocyanide of potassium with the cinchona alkaloids communicated in 1874 (see Proceedings, 1875, p. 409), and has now also subjected the salt of cinchonidia to the reaction, that alkaloid having in recent years acquired some importance as a remedial agent. The results thus obtained have been found by him to have been in the main correct, and they were obtained with the various salts, such as sulphate, hydrochlorate, acetate, salicylate, nitrate, and valerianate of quinia, cinchonia, cinchonidia, and quinidia; the author understanding under the latter name the β quinidia of Kerner or the conchinia of Hesse, and retaining for it the name "quinidia" because of its adoption under that name into several European Pharmacopœias. For the nearer details, the original paper must be referred to, a concise extraction of the more important points only being given in this abstract.

The test is made by dissolving the salt in water in the proportion of 1 to 100, by the aid of gentle heat (converting the sparingly soluble sulphate of quinia, however, preferably into the hydrochlorate by the addition of 25 per cent. chloride of barium), and bringing one-third to one-fourth of a drop of this solution upon the object-glass, beside the same quantity of a solution of sulphocyanide of potassium in an equal quantity of water, and covered in the usual manner. The object-glass, which must occupy a perfectly horizontal position if possible, is then brought under a lens of 110 diameters, after having been allowed to remain at perfect rest for about half an hour. When the two solutions are first placed upon the slide, a precipitate is produced at the points of contact, which, even under a lens of 500 diameters, has an amorphous, dusty appearance; this, if the solutions have not been too concentrated, soon forms droplike aggregations, then becomes crystalline, or disappears by solution. Upon further standing, the crystalline field peculiar to the particular alkaloid is produced, the characters of which are always the same for the same alkaloid, irrespective of the acid with which it

may have been combined. As a rule, 30 minutes is the time required for the perfect formation of the crystalline field, but it is not uncommon that further changes take place after that, and it is therefore recommended to re examine frequently during several hours, particularly in the case of cinchonidia salts. Exceptions to the rule are also explained by the purely mechanical difficulties to always cause absolutely the same quantities of the two solutions to react upon each other.

If the formation of crystals is slow large drops usually separate, for the transformation of which to crystals the surrounding liquid seems to be necessary; and the absence of the latter, by evaporation, gives rise to the final retention of these drops in an amorphous or semi-crystalline condition. The groupings of crystals produced by the different alkaloids are, in general, distinguished by the direction of their development, some developing in the same direction, while others grow in all directions, and the peculiar form assumed by these groups is quite characteristic. Those that develop in one direction have the fan shape for their basis, while those that develop in all directions assume a more or less stellate form. To this latter class belong:

Quinia and Cinchonidia.—The transformation of the amorphous drops into the stellate form occurs rapidly and completely with

FIG. 54.

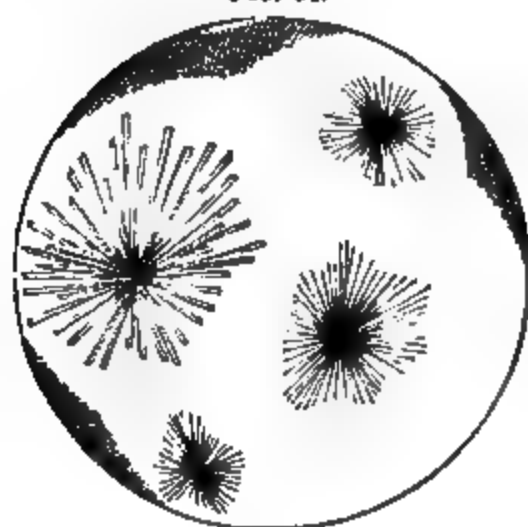


FIG. 55.

Quinia and Potassium Sulphocyanide.

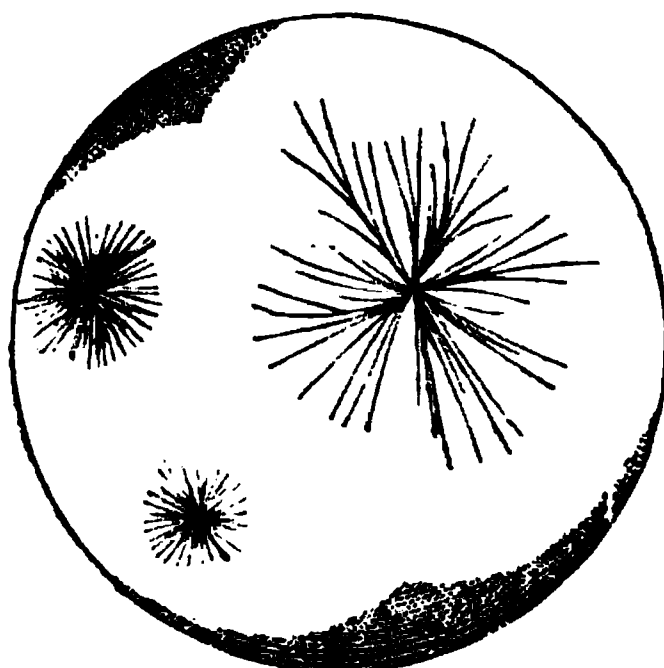
quinia, unless the solution has been too dilute (for instance, in the case of sulphate of quinia it is quite slow); and often incomplete in the case of *cinchonidia*. For this reason the cinchonidia salts show, along with well-developed, starry groups, some that are in various stages of development: smooth-edged, opaque drops,

drops with hairy or spiked periphery, partially or completely developed stars, which are simple-rayed, allow the light to permeate but imperfectly, and are, therefore, dark by transmitted, and porcelain-like by reflected light. With these exceptions, there is no material difference in the crystalline groupings formed by

FIG. 56.



FIG. 57.

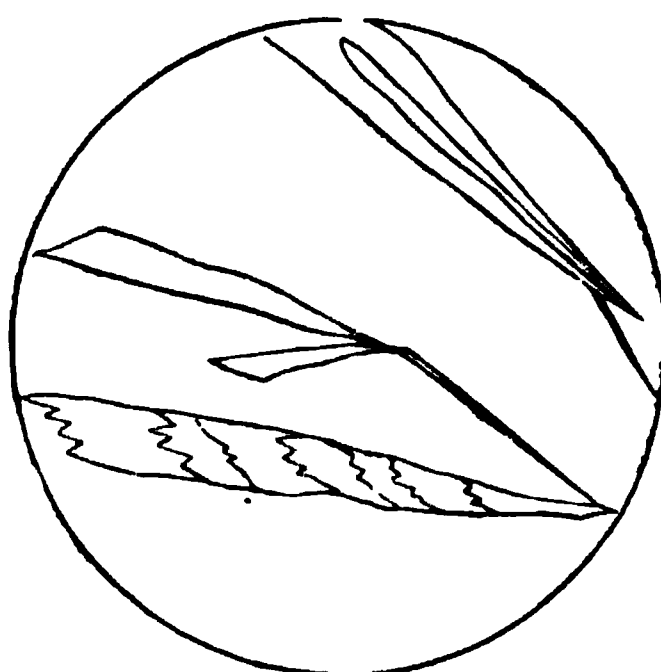


Cinchonidia and Potassium Sulphocyanide.

quininia and cinchonidia, Figs. 54, 55, 56, 57 showing different groupings of both.

Cinchonia shows the same developing process into crystalline groups as quinia, the formations, however, being in one direction, and most primitively fan-shaped. The rays, which preferably extend into the sulphocyanide of potassium solution, are needle-

FIG. 58.



Cinchonia and Potassium Sulphocyanide.

shaped, partly flat, their point forming right-angled or diagonal sections; they are of variable length and thickness, generally

straight, but often, also, bent, simple, or branched. The appearance of the entire field when the rays are very thin is not unlike that of a grass patch (Fig. 59); with the thicker rays the re-

FIG. 59.

FIG. 60.

Cinchona and Potassium Sulphocyanide.

semblance may be likened to equisetum (Fig. 60), while others, again, have a resemblance to layers of slate with steplike dentations on the edges (Fig. 58).

Quinidia (β Kerner; *Conchinea*, Hesse), when first coming in contact with the sulphocyanide solution, forms a semi-transparent liquid, which is partly dispersed in the form of drops in

FIG. 61.



Quinidia (β Kerner) and Potassium Sulphocyanide.

the surrounding clear liquid. Out of this semi-transparent liquid, the coherent as well as that in drops, dendritic, semi-amorphous, or crystalline groupings, rapidly develop and extend into the

surrounding clear liquid; all of the observed forms being generally present, while occasionally only a single form is developed. They are dark by transmitted light, porcelain-like by reflected light, and, in as far as their dendritic forms are concerned, they form wonderfully handsome pictures. These dendritic formations bear at one time resemblance to the branches of *Thuja* (Fig. 63), and again with those of *Juniperus communis* (Fig. 62), and occasionally with the sterile or partly defoliated branches of these plants. Besides these, thick, droplike, opaque, round formations are produced, which show more or less thick, short rays in their periphery (Fig. 61). In a number of observations, some-

FIG. 62.

FIG. 63.



Quinidia (J Kerner) and Potassium Sulphocyanide.

times the one, sometimes another, of the four formations named in the preponderance; but the first two are necessary to establish the identity of the alkaloid, and if only one or both of the last formations are produced it is necessary to repeat the experiment. The first-named formation being quite delicate, they are very easily destroyed; if the object-glass is not in perfectly horizontal position, if the drops are too large, or if the object is moved, their formation may be prevented.

Finally, the author describes some of the formations that are produced by admixtures of the alkaloids with each other.—*Arch. f. Ph.*, July, 1878, pp. 25-37.

In a former paper (*Liebig's Annalen*, 181, 48) O. Hesse had expressed the opinion that the above-named microscopic test is not to be recommended for the cinchona alkaloids in general, and that the detection of cinchonidia in quinia, in particular, gave

unsatisfactory results. While he still maintains his former position, he now admits that the test is available for the detection of cinchonidia in quinia within certain limits, provided that the *quantity* as well as the quality of the sulphocyanide of the alkaloid is taken into consideration. The conditions necessary to make the method available are, in the opinion of Hesse, the following:

1. The sulphocyanide is to be employed in the form of aqueous solution, and should always be of the same degree of concentration.

2. The relative quantity of this solution to that of the alkaloid should be the same for all experiments.

3. The alkaloid solutions should be the saturated solutions of the respective sulphates at the ordinary temperature.

4. The observations of the reactions must be repeated until there is no longer any change observable under the lens.

Regarding (1), the author observes that the relative quantity of sulphocyanide to solvent should, as recommended by Schrage, be as 1 : 1. Saturated solutions of the alkaloids (3) are obtained by digesting one part of their sulphates with ten parts of water at 50°–60° C. (= 122°–140° F.) for several minutes, and, after allowing the mixture to cool to the ordinary temperature, filtering the solution. Such solution, when observed by itself along the microscopic test, should not deposit crystals. The end of the reaction (4) usually takes place in the course of a few minutes, and it is quite rare that the completion of the reaction will require longer time (an hour or more).

Mr. Hesse's observations, under the above provisions, may be briefly stated as follows:

Sulphate of Quinia.—The absolutely pure non-effloresced sulphate of quinia is less soluble in water than is the sulphocyanide formed; nevertheless, crystalline formations are produced under the microscope, owing to the more sparing solubility of the compound in solution of sulphocyanide of potassium than in water. When equal quantities of sulphocyanide of potassium and sulphate of quinia solution are placed upon the slide and covered, at the moment of contact an insignificant separation of small drops is observed at the point of contact, which disappears in a few minutes, needle-shaped crystals are formed, and these arrange themselves to form densely rayed stars, the number of which is quite small. The microscopic picture which Godeffroy claims to have

observed with pure sulphate of quinia (see Proceedings, 1878, p. 570, Fig. 78 (= Fig. 1 in the original)) could not be observed with truly pure sulphates of quinia. Mr. Hesse lays particular stress upon the purity of this salt, which, according to the tests of purity given in some Pharmacopœias, may contain as high as 20 per cent. sulphate of cinchonidia.

Sulphate of Cinchonidia.—The addition of sulphocyanide of potassium to the sulphate solution causes immediate turbidity, owing to separation of amorphous sulphocyanide of the alkaloid; the latter soon changes to concentric groups of needles. Under the microscope, at first contact, small oil-like drops are produced, which gradually disappear and give place to concentrically grouped needles. In contradiction to Schrage, the sulphocyanide of the alkaloid is completely precipitated, and not soluble in excess of sulphocyanide of potassium solution.

Sulphate of Homo-cinchonidia.—The reactions are nearly the same as those for the cinchonidia salt, the transformation of the oil-like globules into crystalline groups being somewhat more rapid, and the latter are interspersed with isolated needles.

Sulphate of Conchinia—(*Kerner's β Quinidia*).—The sulphocyanide requires, as already previously stated by Mr. Hesse, 1477 parts water for solution, and is the least soluble of the sulphocyanides of the cinchona bases. This sulphocyanide rapidly changes from the amorphous to the crystalline state. If this transformation, however, is impeded, as is the case between the two glass plates under the microscope, very handsome dendritic groups are formed. If moderately dilute solutions are employed, star-shaped groups of flat needles are formed along with these dendritic groups, and now and then, also, longish six-sided leaflets are observed attached to the end of branches of the dendritic groups.

Sulphate of Cinchonia.—Sulphocyanide of potassium occasions a curdy precipitate in the solution of the sulphate at the ordinary temperature; in the moderately warm solution handsome prisms and leaflets. If an excess of the precipitant is employed, the whole of the alkaloid is precipitated completely. The formation of crystalline groups under the microscope follows, in the main, the same course of development as in the case of the conchinia compound. Owing to the fact, probably, that the sulphocyanide of cinchonia is somewhat more soluble than that of conchinia, the

crystals of the former can develop better, and the single crystals become larger. To these, other crystals attach themselves in various directions, and this produces the dendritic forms observed. Besides these groups single prisms and fan-shaped groups are also observed. The various comparisons of these forms with those of equisetum, grass patches, layers of slate, with steplike dentations, etc., are, in the author's opinion, not of much value. In fact, the author does not admit that the method applied to the cinchona alkaloids is of any practical value whatever, though, under the conditions given by him, it is possible to determine the presence of 1 per cent. of cinchonia and of conchinea (quinidia), and of 5 per cent. of cinchonidia and of homo-cinchonidia in sulphate of quinia.—Arch f. Ph., December, 1878, pp. 481–490.

Cinchona Alkaloids—Composition—Products of Oxidation, etc.—Dr. Zd. H. Skraup, contrary to the view hitherto accepted, that

Cinchonia has the composition expressed by the formula $C_{20}H_{24}N_2O$, finds now, that when perfectly pure it has a composition corresponding to the formula $C_{19}H_{22}N_2O$. This view is confirmed by numerous analyses of the alkaloid, its hydrochlorate, iodhydrate, neutral sulphate, as well as the chloroplatinate produced from various samples and fractions of cinchonia. The author has furthermore determined that commercial cinchonia always contains a second base which adheres to it very tenaciously, and which is identical with the

Hydrocinchonia of Caventou and Willin.—It was obtained with great difficulty, however, by fractional crystallization to the amount of about 1 per cent., and its composition was found by the author to correspond to the formula $C_{19}H_{24}N_2O$. Caventou and Willin had also taken the view that this alkaloid existed ready formed in cinchonia, while Hesse held the view that it was produced by the oxidation of that alkaloid. Dr. Skraup prefers to call this base

Cinchotina, because it has no connection with the cinchonia derivatives produced by hydration. Furthermore, the author has examined the products of oxidation that are produced by treatment of cinchonia with permanganate of potassium. Caventou and Willin had found that by the moderate action of permanganate on cinchonia, a feebly basic body,

Cinchotenina ($C_{18}H_{20}N_2O_3$), an acid, *carboxycinchonic* ($C_{21}H_{14}N_2O_4$), and a substance having the property of reducing Febling's solu-

tion powerfully, were produced. The author now finds that by careful oxidation only cinchotenina and formic acid are produced from the cinchonia; carboxycinchonic acid only being produced if the action is more energetic, and is apparently derived from the cinchotenina. Weidel had already expressed the opinion that carboxycinchonic acid is identical with his

Cinchonic acid, for which he gave the formula $C_{20}H_{14}N_2O_4$. The author now proves this to be really the case, but at the same time has determined that the formula of cinchonic acid should properly only be half that given by Weidel. By substituting chromic acid for the permanganate as oxidizing agent, this acid can be obtained to the amount of over 50 per cent. of the cinchonia employed. Cinchonic acid is also produced from *cinchonidia*, which by oxidation is primarily converted into *cinchotenidina*,—corresponding to cinchotenina,—which in its turn oxidizes to cinchonic acid. *Quinia* and *quinidia* (conchinia) were subjected to examination in the same direction. While they do not yield cinchonic acid, each of them produces by oxidation a non-volatile acid which appears not to have been subjected to a nearer examination. Finally, the author declares the *homocinchonidia* of Hesse to be in conformity with his previously expressed conjecture, simply *cinchonidia*.—Ph. Centralh., June 5th, 1879, p. 227; from Sitzungsber. d. ch. phys. Ges., February 4th, 1879.

Iodosulphates of the Cinchona Alkaloids.—The very sparing solubility of iodosulphate of quinia in very strong alcohol, and the circumstance that an alcoholic solution of acid sulphate of quinia requires little more than the theoretic quantity of iodine for complete precipitation, are quite characteristic. Upon these characteristics B. W. Dwars, of Osaka, Japan, bases a method for determining the purity of sulphate, as well as other salts of quinia. 50 mgrms. of sulphate (45 mgrms. hydrochlorate, 65 mgrms. citrate, or 43 mgrms. pure) of quinia are dissolved in 10 cc. of 92 per cent. alcohol, at a temperature of $15^{\circ}C.$ ($= 59^{\circ}F.$), 1 drop of diluted sulphuric acid is added, then 2 drops of tincture of iodine. Upon vigorous agitation the hercynite is at once precipitated. The other cinchona alkaloids require more concentrated solution and more iodine before they are precipitated as iodosulphate; the proportion differing, however, with these alkaloids also; cinchonidia requiring less iodine than quinidia, and quinidia less than cinchonia. If to an alcoholic and

acidulated solution of these alkaloids iodine is added drop by drop, the precipitate is redissolved on agitation until the iodine has been added in the excess necessary for the particular alkaloid.—Arch. f. Ph., April, 1879, p. 329.

Cinchona Febrifuge.—Mr. John Eliot Howard, in a communication to the Under Secretary of State for India, gives it as his opinion that the “mixed alkaloids” from Darjeeling bark (*Cinchona succirubra*) cannot be made available as a substitute for quinia, because, among their alkaloidal components, they are liable to contain *aricina*, which he has reason to believe to be a powerful emetic. The amorphous alkaloid may contain a modification of this substance, and as it amounts to 17 per cent. of the amorphous alkaloid it should be eliminated.—Ph. J. Trans., January 18th, 1879, p. 611.

Dr. O. Hesse, referring to this communication of Mr. Howard, believes that his opinion cannot be supported by facts. The bark of *C. succirubra* contains neither *aricina* nor the easily decomposable *cusconia*, with which some authors have confounded *aricina*; and furthermore, it does not yield amorphous substances which can be taken for decomposition products of that alkaloid. It is true that in 1862 Mr. Howard claimed to have prepared *aricina* from the bark in question, but in subsequent investigations of it he does not again mention the alkaloid. Probably the substance was only cinchonina, which under certain conditions crystallizes in a form that resembles *aricina*. As a fact, at the present time the bark in question does not contain the minutest trace of *aricina* or *cusconia*. On the other hand, there are found in it besides varying quantities of quinia, cinchonidia, and cinchonina, also the following alkaloids: conquinia (conchinia), conquinamia, paricina, and two or three other amorphous basic substances, probably also *cinchotin*. Dr. Hesse believes that the unpleasant action of the mixed alkaloids is referable to the individual better known cinchona alkaloids, inasmuch as every person is not similarly affected by them. Under these conditions it would be the business of the physician to determine which substance should be given in a particular case.*—Ph. J. Trans., April 12th, 1879, p. 839.

* This controversy has given the incentive to a further paper by Dr. Hesse, entitled *Paricine and Aricine* (Ph. J. Trans., June 5th, 1879), and one in reply by Mr. David Howard, entitled *Aricine and Paricine* (Ibid., June 21st, 1879), both of which can only be profitably consulted in the original.—RKP.

Quinia—Determination in some of its Compounds.—B. W. Dwars has made some experiments to determine whether the repeated exhaustion of the alkaline liquid containing quinia with chloroform, at present considered necessary to the accurate determination of the alkaloid in some of its compounds, such as the tannate, ferrocitrate, etc., cannot be avoided. His results are in the affirmative. He finds that when a solution of quinia, rendered alkaline by soda or ammonia, is shaken with a known volume of chloroform, the quantity of quinia remaining from the evaporation of a certain volume of the chloroformic solution bears the same relation to the total quantity operated upon that the volume of chloroformic solution subjected to evaporation bears to the total volume of chloroform employed. It is therefore unnecessary to resort to the wasteful and troublesome method of repeated agitation with chloroform in the determinations referred to. The author employs a burette of 25 cc., each cc. divided into tenths, provided with a glass cock, and not, as is usual, bent, but straight at the lower end. The quinia compound, corresponding to about 0.3 gram of sulphate, is dissolved in water, the solution is introduced into the burette and brought to the measure of 10 and not exceeding 12 cc. 10 cc. of chloroform are now added, followed by a slight excess of solution of soda (or ammonia). The open end of the burette having been closed with a moistened cork, the contents are agitated vigorously and then allowed to rest until both layers have become clear. A certain portion of the chloroformic solution is now drawn off into a suitable and previously weighed evaporating vessel (the author uses a beaker, to which a watch-glass is accurately fitted as cover), in which the chloroform is evaporated, the residual quinia dried at 100° C. (= 212° F.), and finally heated for a short time to 110°–115° C. (= 230°–239° F.), to drive off a small percentage of hygroscopic moisture, and weighed. The result, applied to the 10 cc. of chloroformic solution, gives the total quantity of quinia, corresponding to the formula $C_{20}H_{24}N_2O_2$, contained in the sample under treatment.

In the course of Mr. Dwars's experiments it became necessary to inquire whether crystallized sulphate of quinia should be regarded as containing 7 molecules of water of crystallization, and whether it loses all of this by appropriate drying; also, whether the alkaloid, when heated until it no longer loses weight, should be regarded as anhydrous. The following little table shows theoretical requirements:

1. Sulphate of quinia + 7 aq.	(436) : Quinia	+ 3 aq.	(378) = 100 : 86.70
2. " " "	(436) : "	+ 1 aq.	(342) = 100 : 78.44
3. " " "	(436) : "	anhydrous	(324) = 100 : 74.31
4. " " + 2 aq.	(391) : "	+ 1 aq.	(342) = 100 : 87.47
5. " " + 1 aq.	(382) : "	"	(342) = 100 : 89.53
6. " " "	(382) : "	anhydrous	(324) = 100 : 84.82
7. " " anhydrous	(373) : "	+ 1 aq.	(342) = 100 : 91.68
8. " " "	(373) : "	anhydrous	(324) = 100 : 86.86

By careful experiments, which need not be given in detail, the author obtained figures which correspond very closely with 3 and 8 in the above table. Normal crystallized sulphate of quinia gave as a mean of 4 experiments 74.26 per cent. anhydrous quinia, while sulphate of quinia, dried at $114^{\circ}\text{C.}(=237.2^{\circ}\text{F.})$ gave 86.81 per cent. anhydrous quinia, numbers which correspond sufficiently close with the theoretical figures above given, and which justify him in the following conclusions:

1. Sulphate of quinia loses all of its water of crystallization when it is heated to a constant weight at $114^{\circ}\text{C.}(=237.2^{\circ}\text{F.})$, for which purpose about 1 to $1\frac{1}{2}$ hour is required when operating in small quantities, and the salt is then entitled to the formula $\text{C}_{20}\text{H}_{24}\text{N}_2\text{O}_2\text{H}_2\text{SO}_4$.

2. Quinia, obtained from its chloroformic solution by evaporation and dried at $100^{\circ}\text{C.}(=212^{\circ}\text{F.})$, can retain only a very small percentage of hygroscopic moisture, which it loses completely when the temperature is raised for a short time to 110° to $115^{\circ}\text{C.}(=230^{\circ}\text{ to }239^{\circ}\text{F.})$, and then has the formula $\text{C}_{20}\text{H}_{24}\text{N}_2\text{O}_2$.

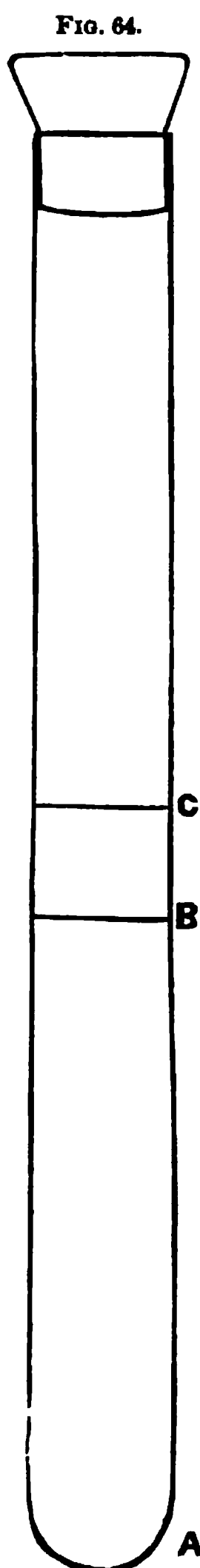
In the author's above modification of the usual method for estimating quinia in its compounds, ether cannot be substituted for chloroform, because of its solubility in water, and its property of dissolving the latter.—Arch. f. Ph., February, 1879, pp. 149–155.

Quinia—New Test.—O. Hesse uses and recommends a modification of the usual test for sulphate of quinia which is based upon the following observations:

1. That water at 50° – $60^{\circ}\text{C.}(=122^{\circ}$ – $140^{\circ}\text{F.})$ dissolves sulphate of quinia but sparingly, while it dissolves the other sulphates readily without producing their decomposition (separation of alkaloid).

2. That when the cooled solution, after supersaturation with ammonia, is shaken with a certain quantity of ether which is sufficient to dissolve all the quinia present, this quantity of ether

is not sufficient to dissolve the other alkaloids if they exceed certain limits. For executing the test the author uses a test-tube



Quinia Testing.

of the size given by Fig. 64, which he names *quiniometer*. The internal diameter of this tube is 10–11 mm., its height 120 mm. It is provided with the marks *B* and *C*. The space below *B* (to *A* in the drawing) has the capacity of 5 cc.; the space between the lines *B* and *C*, the capacity of 1 cc. With this instrument the test is now made as follows:

“0.5 gram sulphate of quinia and 10 cc. water at 50°–60° C. (= 122°–140° F.) are shaken together in a test-tube several times. After ten minutes 5 cc. of the clear filtered solution are introduced into the *quiniometer*, 1 cc. of ether is added, followed by 5 drops of solution of ammonia. The quiniometer is now closed with a cork, is agitated gently, and allowed to stand for several hours. If the ethereal layer is now examined with a lens it should show no evidence of crystals.”

The absence of crystals under the conditions named is evidence of sufficient purity; but the compound may still contain 0.25 per cent. sulphate of cinchonia, 0.5 per cent. sulphate of conchinea (*quiniidia*), and about 1 per cent. of sulphate of cinchonidia or homocinchonidia. If these alkaloids are present in larger quantities crystals will separate in the ethereal layer, which are granular if homocinchonidia or cinchonidia, concentrically grouped needles if cinchonia or conchinea. The two former, homocinchonidia and cinchonidia, are most likely to be present in the commercial article that is not intentionally adulterated, because of their liability to crystallize out along with the quinia in the course of manufacture. Nevertheless, by careful manipulation they may readily be removed to within the limits above named. In the presence

of 3 per cent. of these two alkaloids the separation of granular crystals takes place within three minutes after shaking with ether; if ten minutes are required their quantity does not exceed

2 per cent. ; no crystals deposit within two hours if 1 per cent. is present, but a few are deposited after twelve hours' standing. If not, the quantity of cinchonidia or homocinchonidia present is less than 1 per cent. Traces of these alkaloids may be determined by loosening the cork so as to permit the slow evaporation of the ether, when some crystals may be observed in the otherwise amorphous residue ; with 0.5 per cent. of these alkaloids the residue is distinctly crystalline.

The presence of 0.5 per cent. of sulphate of cinchonia or 1 per cent. of sulphate of conchinea is evidenced by the formation of an immediate deposit of crystals, and their presence is in all probability due to adulteration ; the properties of sulphate of quinia being such that their presence as a result of the process of manufacture is not possible. In the hydrochlorate of quinia, on the other hand, the hydrochlorate of both of these alkaloids may be present, while the corresponding salts of homocinchonidia and of cinchonidia are not so likely to be present. These admixtures are determined by the following modification of the test whereby the hydrochlorates are first converted into sulphates :

“ 0.5 gram of hydrochlorate of quinia and 0.25 gram of crystallized sulphate of sodium (Glauber's salt) are added to 10 cc. of hot water (about 60° C. (= 140° F.)) contained in a test-tube ; the mixture is well shaken, and then treated as in the case of sulphate of quinia. The result is quite as delicate as in the first process.”

Dr. Hesse claims that his new method is superior in every respect to any that has yet been proposed for the determination of purity of quinia salts, being easily executed even with moderate skill, and at the same time more delicate than the methods generally employed. Regarding the presence of the sulphates of cinchonidia or of homocinchonidia, he is of the opinion that their quantity should not exceed 1 per cent., and that it is quite possible to prepare sulphate of quinia, in which these alkaloids do not exceed the limit named, from cinchona barks that contain them in preponderating quantities.—Arch. f. Ph., December, 1878, pp. 490–495.

Quinia—Estimation in Ferri et Quiniæ Citras, B. P.—Mr. W. Stevenson communicates the following modification on the B. P. process whereby more accurate results are claimed to be obtained :

5 grams of the citrate are dissolved in 50 cc. of water, a slight

excess of dilute ammonia, .960, is added, the mixture well stirred, and transferred to a filter composed of two filters of equal weight, the one being intended to balance the other at the final weighing. A wash-water, composed of 1 ounce of ammonia, .880, and 8 ounces of distilled and as much well-washed quinia (from 1 drachm of sulphate) as this will hold in solution, is then used for freely washing the quinia upon the filter. By this procedure no quinia is lost and all traces of iron may be removed in from five to ten minutes, leaving the alkaloid white and granular. In this short time any quinia deposited by evaporation of the washing solution would be so small that it may be neglected. The filter is removed from the funnel and thoroughly drained for two or three hours upon bibulous paper, and then dried at a temperature not exceeding 100° F. until constant in weight, the outside filter acting as a counterpoise. If the draining is omitted, the water held by the precipitate will, on becoming hot, dissolve a portion of it. The proposed modification is an adaptation of Teschemacher's method of estimating morphia in opium.—Ph. J. Trans., February 15th, 1879, p. 673.

Quinina—Separation as such from Urine.—Kerner has assumed that quinia, after its internal exhibition, is found in the urine changed to dihydroxylquinia, which is also produced by the action of oxidizing substances upon the alkaloid, while Guillochin maintains that the quinia is changed to quinidia, and as such is found in the urine. Personne has collected the alkaloid from the urine of patients for some time, and has recently subjected it to an examination which leaves no doubt that the quinia passes as such through the urine. The quinia is precipitated from the urine by tannic acid, the precipitate is washed, treated with hydrate of lime by boiling, mixed with sand, and the mixture extracted with chloroform. The residue of evaporation is quinia, impure by the presence of a resinlike body. The latter may be removed by solution of the quinia in dilute sulphuric acid. The urine of a patient who had taken 2 grams of sulphate of quinia within two days yielded by the above method 0.319 grams of quinia; the separation of quinia from the urine being ended in eight days. The results show that the quinia is decomposed by the digestive process, and that the portion which escapes such decomposition passes through the urine in an unchanged condition.

Dr. Hager reminds in this connection that the fæces may also contain the alkaloid.—Ph. Centralh., January 9th, 1879, p. 10.

Quinia—Alleged Conversion into Quinidia.—Personne has been engaged in some researches to ascertain whether, as asserted by M. Guillochin, quinia is converted into quinidia during its passage through the human system, or undergoes any other modification. The author's results are in the negative. By treating the urine of patients under antiperiodic treatment with tannin he obtained a considerable quantity of perfectly white crystallized quinia sulphate, but no quinidia. In one case, where 2 grams of crystallized sulphate were administered, Mr. Yvon, effecting the precipitation with pure tannin, obtained from the urine 0.3 gram.—Ph. J. Trans., August 17th, 1878, p. 125.

Quinia—Production of Thalleioquin in Dilute Solutions.—Having experienced some difficulty in obtaining the green coloration in very dilute solutions of quinia by the ordinary process with chlorine and ammonia,—perhaps in consequence of the chlorine solution not being freshly prepared,—Mr. S. R. Challice has made some experiments with the following solution with very good results: One-half ounce of solution of chlorinated soda is put into a 10-ounce stoppered bottle, 60 minims of diluted hydrochloric acid are added, and the mixture is allowed to stand half an hour, then $\frac{1}{2}$ an ounce of water is added, and the solution is ready for use. To 6 drops of this solution, mixed with 2 drachms of a solution containing 1 grain of quinia in 40 ounces of water, add 1 drop of strong solution of ammonia, when a decided green coloration will be produced, and also the red color upon adding solution of ferrocyanide of potassium between the chlorine and ammonia. The chlorine and quinia should be agitated for several seconds before adding the ammonia, as the color is not developed if the ammonia is added immediately after the chlorine. After dropping in the ammonia the solution should not be shaken until a decided color appears at the upper portion of the liquid. If it is then slightly agitated the color gradually deepens on standing a few minutes.—Ph. J. Trans., March 8th, 1879, p. 735.

Quinia Salts—Extemporaneous Preparation.—The following formulas, from "Jour. Phar. Chim." (May, 1879, p. 453), for the extemporaneous preparation of various quinia salts, are evidently intended to produce these compounds in a form in which they shall be dispensed with the second compound resulting from double

decomposition, but giving also the quantities of each ingredient required in their regular preparation, may serve a good purpose:

Carbolate of Quinia.—Pure quinia, 2 drachms; carbolic acid, 1 drachm.

Citrate of Quinia.—Pure quinia, 15 grains; citric acid, 8 grains. The product corresponds to 20 grains of citrate of quinia.

Hydrobromate of Quinia.—Sulphate of quinia, 100 grains; bromide of potassium, 28 grains. The product corresponds to 100 grains of hydrobromate of quinia.

Hydriodate of Quinia.—Sulphate of quinia, 95 grains; iodide of potassium, 40 grains. The product corresponds to 100 grains of hydriodate of quinia.

Hypophosphite of Quinia.—Muriate of quinia, 100 grains; hypophosphite of calcium, 24 grains. The product corresponds to 100 grains of hypophosphite of quinia.

Lactate of Quinia.—Pure quinia, 70 grains; lactic acid, 35 grains. Rub with a few drops of alcohol, if necessary. This represents 100 grains of lactate of quinia.

Phosphate of Quinia.—Sulphate of quinia, 94 grains; phosphate of sodium, 80 grains. This represents 100 grains of phosphate of quinia.

Muriate of Quinia and Urea (Chininum Bimuriaticum Carbamidatum)—*A New Double Salt.*—Drygin has prepared and recommends a double salt of quinia and urea, such being, on account of its extreme solubility in water, particularly useful for hypodermic injection. One equivalent (396.5 parts) of muriate of quinia is dissolved in one equivalent of hydrochloric acid (about 250 parts of sp. gr. 1.07), and the solution is filtered; one equivalent (60 parts) of pure urea (freed from sulphate of ammonium by recrystallization from absolute alcohol) is then dissolved in the filtrate by gentle heat, and the vessel is immediately placed in a cool place. After twenty-four hours the crystals are collected on a funnel, washed with a small quantity of cold distilled water, spread upon a plate, and dried at the temperature of the room. The mother liquor, upon evaporation, yields additional crystals, and is not injured by boiling; finally, a syrupy liquid remains, which is no longer capable of producing crystals, even at -80° C. ($= 0^{\circ}$ F.), and which is composed almost completely of a new alkaloid—*cinchonichin*.

The new double salt forms hard, white, agglutinating, four-sided prisms when crystallizing from hot solution; by spontaneous evaporation very long, transparent prisms may be obtained. It is soluble in its own weight of water, forming a thick, straw-yellow, permanent solution. Owing to the considerable depression of temperature during the process of solution, the rapidity of solution is considerably retarded, and it may, therefore, readily be washed with cold water, without incurring much loss. The salt is not hygroscopic; it melts at 70° – 75° C. ($=158^{\circ}$ – 167° F.), congeals to a yellowish mass, and loses 10 per cent. of water, all of which, however, it again absorbs on standing several days, and the mass again becomes white. From its aqueous solution the entire salt may again be recovered in crystals. It is soluble in alcohol, and from such solution it is precipitated, apparently partly decomposed. The acid muriate of quinia is capable of uniting with $\frac{1}{2}$, 1, and 2 equivalents of urea. The first, *chinin. bimur. semicarbamidatum*, crystallizes with difficulty in short, thick, opaque prisms; the second is the salt above considered; the third, *chinin. bimur. bicarbamidatum*, forms handsome, well-formed, 4 and 6 sided, colorless, and permanent prisms. *Quinidia*, like quinia, forms a crystalline double compound with urea. The crystals are yellowish. The price of the new compound should not be higher than that of muriate of quinia, since $3\frac{1}{2}$ pounds of the latter and $6\frac{1}{2}$ ounces of urea yield 4 pounds of the double compound.—Ph. Centralb., November 21st, 1878, p. 445.

Kinate of Quinia—Hypodermic Application.—Mr. Henry Collier has prepared kinate of quinia which, by reason of its solubility, seemed to answer a good purpose for hypodermic use. A quantity of kinate of calcium was converted into kinate of barium. This salt is freely soluble in water, and upon adding to its solution sulphate of quinia in powder, the whole of the barium is precipitated, and kinate of quinia remains in solution. Upon evaporation of the solution, even under the air-pump over sulphuric acid, the kinate remains as an amorphous mass. It is nevertheless crystalline, as evidenced by slow evaporation on a glass slide under the microscope, under which conditions it shows crystalline tufts. When obtained by slow evaporation at the ordinary temperature the compound retains considerable water, some of which it loses by keeping at 90° F. The author, therefore, evaporates the solution on a water-bath to dryness, and powders the dry mass. Kinate of quinia is very soluble in water. Parrish's

"Practical Pharmacy" gives the solubility to be 1 p. in 4 p. water, and a solution of that strength has been adopted for hypodermic use in Guy's Hospital, London, though it is quite possible to obtain a solution of 1 p. in 3 of water. It has so far proved quite satisfactory, both on account of its solubility and neutrality.—Ph. J. Trans., August 10th, 1878, p. 104.

Iodide of Bismuth and Quinia.—Mr. F. W. Fletcher, in experimenting upon a complex solution which was known to contain quinia, obtained upon the addition of iodide of potassium a copious scarlet precipitate, not sufficiently vivid in color, however, to be taken for mercuric iodide, which, upon examination, proved to contain both bismuth and quinia, and the analysis of which shows it to be a new double iodide, corresponding to the formula, $(\text{BiI}_3)_2\text{C}_{20}\text{H}_{24}\text{N}_2\text{O}_2\text{HI}$. The new compound is very sparingly dissolved by cold, but more freely by hot water. Rectified spirit dissolves it slightly in the cold, but very readily when warmed. It is completely taken up by alcoholic solution of iodide of potassium, forming a brilliant crimson solution. It is decomposed by the stronger acids with liberation of iodine. Digested with ammonia solution its color is destroyed, and an insoluble residue of oxide of bismuth and quinia remains.—Yearbook of Pharm., 1878, p. 598.

Conchinea.—*New Test*.—Dr. Hesse draws attention to the fact that "sulphate of conchinea" is now to be had, particularly in German commerce, in a chemically pure condition; but that in England, France, and other countries the article is frequently of variable composition. Under these circumstances he considers it desirable that a simple test should be more generally known, whereby the purity of commercial samples may be determined with very little trouble. This test, which he has conformed as much as possible to his "quinia test" (see Quinia), is as follows: 0.5 gram sulphate of conchinea and 0.5 gram pure iodide of potassium are added to 10 cc. of hot water (about 60°C . ($=140^\circ\text{F}$.)), contained in a test-tube, and the mixture is thoroughly agitated several times. After an hour the liquid is filtered and a drop of ammonia added to the filtrate, which should not become turbid by that addition.—Arch. f. Ph., December, 1878, p. 495.

Cinchonichin — *A New Alkaloid*.—This alkaloid, mentioned above, is found by the author to the extent of 6 per cent. in commercial sulphate of quinia, and to a less extent in the com-

mercial muriate. As stated, it composes the greater part of the residual mother liquor in the preparation of chinin. bimur. carbamidatum, from which it may be obtained as follows: The liquor is diluted with water, ammonia is added in excess, the precipitate washed, extracted with ether, and the residue dissolved in the smallest possible quantity of chloroform, which leaves any cinchonidia that may be present. The chloroform being evaporated, the residual alkaloid is converted into sulphate and purified by recrystallization. If the yellowish precipitate, occasioned by chlorine-water and ammonia, should acquire a grayish-green color after a time, the alkaloid is reprecipitated by ammonia, and crystallized spontaneously from alcohol, and washed again with ether. Cinchonichin is extremely soluble in chloroform, with more difficulty in ether, but yet more readily than cinchonidia; it is precipitated from alcoholic solution, in form of small rhombic tables, by water, and is obtained in large crystals of that form by the spontaneous evaporation of the alcoholic solution. The neutral sulphate of the new alkaloid is soluble in water with as much difficulty as the corresponding quinia salt, and crystallizes in glistening needles, which are not efflorescent, and split in the direction of their lateral axis. It has a marked affinity for coloring matters, and when such is present in larger quantities the sulphate is readily soluble in water. Its physiological action has not yet been determined, but an inference may possibly be drawn from the circumstance that chinnium bimur. carbamidatum does not produce the peculiar ringing in the ears which, as is well known, is produced when large quantities of the ordinary sulphate of quinia are taken; the latter containing, as already mentioned, a considerable percentage of cinchonichin.—Ph. Centralh., December 12th, 1878, p. 472.

Strychnia—Chloral an Antidote.—Professor Husemann, of Göttingen, has discovered that chloral hydrate is not only an antidote to strychnia, but to the mixture of strychnia bases, sold under the name of brucia. It has also a counteracting effect upon the opium alkaloid thebaia. In a certain degree, also, the hydrate of chloral antagonizes picrotoxin, codeia, and calabaria.—Drug. Circ., May, 1879, p. 91.

Brucia.—In former papers Mr. W. A. Shenstone had given the details of some experiments made with brucia, particularly with reference to its alleged conversion into strychnia (see Proceed-

ings, 1878, p. 587). He now gives the results of observations made then and since, which are as follows :

1. After many experiments it was found that the yield of strychnia obtained by acting on brucia with nitric acid steadily decreases as additional processes of purification are employed, till finally it completely disappears, thus confirming the results arrived at by Mr. Cownley (see Proceedings, 1877, p. 353); and subsequent work has satisfied the author that an application of Sonnenschein's process (see Proceedings, 1875, p. 419) may be made a fairly delicate test for the presence of strychnia in brucia.

2. Several specimens of commercial brucia have been examined. All contained strychnia, the proportion varying from 1.05 to 0.25 per cent., which, regarding the activity of the impurity, may be considered as an important quantity.

3. An examination of false angustura bark has shown that this bark does contain strychnia, the rather small quantity present being probably the reason that its presence was overlooked by Pelletier and Caventou.

4. Brucia yields decomposition products to the action of weak acids, weak alkali, and water. These bodies promise to be chiefly of chemical interest, and are being further investigated.

Regarding the method of purification recommended (Proceedings, 1877) the author observes that he finds labor and waste are avoided by stirring the dry brucia with a little water and the acid (acetic), and adding them gradually with agitation to the boiling water; this plan prevents the formation of masses of a white solid, difficult of solution, said by Schützenberger to be a variety of igasuria, but which the author believes to be wholly or partly dehydrated brucia.—Yearbook of Pharm., 1878, p. 495.

Atropia—Morphia not an Antidote.—Dr. Knapstein has made a series of experiments to determine the possible value of morphia as an antidote for atropia, and of the latter as an antidote for morphia. The results showed that by the simultaneous administration (hypodermically) of morphia with atropia, neither of the alkaloids could be given in poisonous doses, though the one employed as the antidote in no case was in quantity sufficient to produce deleterious effects. Indeed the effects of both seem to be coincidental.—Ph. Centralh., December 26th, 1878, p. 499.

Atropia and Daturia.—These two alkaloids have hitherto been generally assumed to be chemically identical, v. Planta's results

having been accepted as correct. Recent investigations of Poebl, however, prove that they are chemically distinct. Poebl isolated the two alkaloids from belladonna and datura, and found atropia to be optically indifferent, while daturia is lævogyrate (14.12°). Salts of atropia are precipitated by platinic chloride, and not by picric acid; the reverse is true with daturia.—Ph. Centralh., October 3d, 1878, p. 371.

Aconite Alkaloids.—Messrs. C. R. Alder Wright and A. P. Luff, since the presentation of their third report on the aconite alkaloids (see Proceedings, 1878, p. 597), have accomplished a large amount of additional work, chiefly of a purely chemical nature, the details of which have been published from time to time in "Journ. Chem. Soc.," while the principal results have been communicated to the Br. Pharm. Conference.

Pseudaconitia.—Certain salts can be obtained in a well-crystallized state by special manipulation. The formula previously deduced, $C_{38}H_{49}NO_{11}$, has been found incorrect; the substance was, in fact, a mixture of pseudaconitia, $C_{38}H_{49}NO_{13}$, and of a base derived therefrom by the removal of the elements of water, which the authors have named

Apopseudaconitia — $C_{38}H_{47}NO_{11}$.—This resembles the parent base very closely, and is readily obtained by heating pseudaconitia, dissolved in a large excess of tartaric or hydrochloric acid, for some hours at 100° C. ($= 212^\circ$ F.), though if the latter acid is used a portion of the pseudaconitia is split into veratric acid and

Pseudaconia, while in case of tartaric acid only dehydration to apopseudaconitia takes place. The splitting up of pseudaconitia into the pseudaconia and veratric acid, which, in last year's report, was recommended to be done by heating to 140° C. ($= 284^\circ$ F.) with water in sealed tubes, may be accomplished much more readily by simply boiling for some hours with alcoholic soda, an inverted condenser being attached. Moreover, the substance which the authors regarded last year as pseudaconia has now been found to be a dehydrated derivative of that substance, for which they propose the name,

Apopseudaconia, the formula for which is $C_{37}H_{45}NO_8$. It is formed when water and pseudaconitia are heated in sealed tubes to 140° C. ($= 284^\circ$ F.), under which circumstances, doubtless, the alkaloid is first dehydrated to apopseudaconitia, and this then

split into veratric acid and apopseudaconia. When pseudaconitia is heated to 100°C. ($= 212^{\circ}\text{F.}$), with a large excess of glacial acetic acid, for some hours, it loses the elements of water, and

Acetylpopseudaconitia is formed. This has the composition $\text{C}_{28}\text{H}_{46}(\text{C}_2\text{H}_3\text{O})\text{NO}_{11}$, and like pseudaconitia and apopseudaconitia it crystallizes with H_2O , in which respect the pseudaconitia derivatives all differ from the analogous aconitia derivatives described below, all of which are anhydrous. When pseudaconitia is acted upon by benzoic anhydride the corresponding

Benzoylpopseudaconitia is produced, which, like the other members of the pseudaconitia series, forms a crystalline nitrate and gold salt; the free base, however, only crystallizes indistinctly from ether. On heating pseudaconia with benzoic anhydride

Dibenzoylpopseudaconia, $\text{C}_{27}\text{H}_{38}(\text{C}_7\text{H}_5\text{O})_2\text{NO}_8$, is produced. This does not dissolve readily in water, nor does it crystallize easily. By substituting acetic anhydride for benzoic anhydride the corresponding

Diacetylpopseudaconia is produced.

As mentioned in their last report the drug sold under the name of "aconitia (from *A. ferox*)" contains more or less amorphous bases, which do not yield crystalline salts; and although these amorphous bases are not inert, they seem to be considerably less physiologically active than pure pseudaconitia. The authors, therefore, are of the opinion that this drug "aconitia (from *A. ferox*)" should be discarded, and the crystalline *nitrate of pseudaconitia* employed instead. This is almost insoluble in water, containing 8 to 10 per cent. nitric acid, and its preparation and purification not a matter of difficulty; it is not necessary that the alkaloid should have been approximately purified by crystallization from ether, alcohol, etc., in order to prepare a well-crystallized and almost chemically pure nitrate of pseudaconitia. The authors have succeeded in converting crude alkaloid containing 25 to 30 per cent. of uncrystallizable bases, into a crystalline magma, by simply rubbing in a mortar with dilute nitric acid and gradually dropping in strong acid with constant rubbing; on draining the magma over a filter-pump, and washing slightly with water containing 8 to 10 per cent. of nitric acid, an almost pure salt is at once obtained; if required, this can be readily purified by dissolving in a minimum of hot water, dropping in strong

nitric acid when cool, and vigorously stirring, when almost the whole crystallizes out, and is obtained pure by filter-pumping and pressing.

Aconitia.—In addition to previous results the authors have found that the theoretical amount of benzoic acid is obtainable from aconitia by simply boiling for some hours with alcoholic potash or soda, whereas complete saponification with water at 140°C. ($= 284^{\circ}\text{F.}$) in sealed tubes does not take place even after twenty-four hours, although about 85 per cent. of the base is thus decomposed. Aconitia forms a series of derivatives precisely similar to those of pseudaconitia, and under almost identically the same conditions. These are *apoaconitia*, *acetylapoaconitia*, *benzoylapoaconitia*, *aconia*, and *apoaconia*.

The remarks made by the authors as to the desirability of securing for the drug trade, and for medicinal purposes, definite pure aconite alkaloids, apply with the same force to aconitia that they do to pseudaconitia. Aconitia is so readily crystallizable from ether that the preparation of the base free from amorphous alkaloids is a matter of great ease; or the process of conversion into crystallized nitrate, so as to separate non-crystalline bases, might be equally well adopted. So far as they are able to judge apopseudaconitia and apoaconitia are not inferior in activity to the parent base, so that there would be no necessity to separate the "apo" derivatives should they be present.—Yearbook of Pharm., 1878, pp. 483–490.

Alkaloids from Japanese Aconite Root.—Referring to the paper of Messrs. Paul and Kingzett, in the "Yearbook of Pharmacy" for 1877 (see Proceedings, 1878, p. 599), Messrs. Wright and Luff give it as their opinion that the formula there given for the crystalline alkaloid, separated by them, approaches nearer to that of pseudaconitia ($\text{C}_{36}\text{H}_{49}\text{NO}_{12}$ *) than that given for the new substance $= \text{C}_{29}\text{H}_{43}\text{NO}_9$. Messrs. Wright and Luff have since examined the alkaloids extracted from different batches of roots imported from Japan, and while their results are as yet incomplete they have got clear evidence that the crystallizable active alkaloid from different batches of roots is in each case the same body, and that it is different from both aconitia and pseudaconitia. The alkaloid is apparently distinct, however, from that partially ex-

* This was the formula for pseudaconitia, as then understood. See Pseudaconitia.

amined by Messrs. Paul and Kingzett, since it readily forms crystallizable salts, especially the nitrate, hydrochlorate, and hydrobromate. That of the latter gentlemen was stated not to form crystalline saline combinations.—Yearbook of Pharm., 1878, p. 491.

Theobromia—Preparation and Characters.—Trojanowski had drawn attention to the fact that cacao shells contained a comparatively large percentage of theobromia, and that the relative quantity in the shells and in the cotyledons did not vary much. Professor Dragendorff, in whose laboratory Mr. Trojanowski's experiments (Arch. f. Pharm., 1875, p. 30) were made, has now had some further experiments made, which prove the value of the shells as a source of the alkaloid. A student in his laboratory, Mr. O. Donker, obtained from 5 kilograms of the shells 7.4 grams of pure and 1 gram of impure theobromia, while another, Mr. C. Treumann, operating by a modification of the first process followed, obtained from 4.5 kilograms 13.5 grams of the perfectly pure alkaloid, yielding only 0.17 per cent. of ash, while the product of Donker yielded 3.6 per cent. Professor Dragendorff has calculated the cost of theobromia, based upon Treumann's yield, which appears to show that it can be prepared from the cacao shells at about one-sixth the sum of the lowest commercial quotation. The processes followed may therefore be of interest. Donker boiled 5 kilograms of the shells thrice with distilled water, expressing strongly while hot. The strained decoctions were treated with basic acetate of lead solution (about 7 kilograms) as long as a precipitate was produced, the precipitate filtered off after 24 hours, the excess of lead removed from filtrate by HS, the filtrate concentrated again, filtered, magnesia added, and evaporated to dryness on the water-bath. The residue was powdered finely, boiled thrice with alcohol of 80 per cent., and filtered hot. Upon concentration of the alcoholic filtrates to near syrupy consistence, the theobromia crystallized out; it was washed with a little water and recrystallized from boiling alcohol. It was believed that the excess of basic acetate of lead employed in this process (nearly $\frac{1}{4}$ th) occasioned the small yield; hence Mr. Treumann, operating upon 4.5 kilograms of the shells, used only 4.5 kilograms of solution of subacetate of lead (930 grams of acetate of lead and 312 grams of litharge). The precipitation of the excess of lead by HS was also believed to affect the yield, and sulphuric acid was employed instead, a few cc. of gelatin

solution being added to the liquid (about 60 liters) before the addition of the sulphuric acid, to facilitate the deposition of the sulphate, while the acid was used only in such quantity that methylviolet showed a faint excess. After standing three days the sulphate had completely settled; the filtrate was concentrated to 8 liters, neutralized with magnesia, further evaporated, excess of magnesia added and dried. It was then treated further as above.

Some experiments upon the composition and reaction of theobromia were also made by Mr. Treumann. Both preparations dried at 110°C . ($= 230^{\circ}\text{F}$.), gave numbers that agree well with the formula $\text{C}_7\text{H}_5\text{N}_4\text{O}_2$. The air-dry substance lost at 110°C . ($= 230^{\circ}\text{F}$.) between 1.39 per cent. and 1.60 per cent. An analysis of theobromia silver, obtained by precipitation from ammoniacal solution, proved the equivalent of theobromia to be 180. The compounds yield a sublimate of theobromia when heated between watch-glasses; and theobromia itself may be sublimed in this way, well-defined rhombic crystals (already previously described) having been obtained several times. Mr. Treumann also proved that the so-called murexide test may be applied successfully to all kinds of theobromia. This test consists in drying a mixture of theobromia and chlorine-water and then adding ammonia, when the well-known red color of murexide is produced. Trojanowski, in his above-mentioned paper, had mentioned that certain kinds of theobromia failed to produce the murexide color, and Donker had also failed to produce it with his preparation. It seemed probable, therefore, that a second alkaloid might exist in cacao, which, while isomeric with theobromia, differed from it in this and perhaps other respects. Treumann has now found:

1. The murexide test succeeds best when the solution of theobromia in chlorine-water is evaporated as rapidly as possible at a temperature not below 100°C . ($= 212^{\circ}\text{F}$.).

2. The quantity of chlorine-water may vary within considerable limits under these conditions.

3. That all samples of theobromia examined by the author give the reaction if the conditions under 1 are fulfilled. The solubilities of theobromia in certain solvents were also determined. Mr. T. found that 1 part was soluble in 147 to 150 parts of water at 100°C . ($= 212^{\circ}\text{F}$.); in 1600 parts of water at 17°C . ($= 62.6^{\circ}\text{F}$.); in 422.5 parts of boiling absolute alcohol, as the mean of four experiments; in 4284 parts absolute alcohol at 17°C .

(= 62.6° F.); and in 105 parts of boiling chloroform. He also found that boiling alcohol of 80 per cent. dissolves the alkaloid more abundantly than boiling absolute alcohol. Finally, Mr. T. found that phosphomolybdic acid precipitates theobromia amorphous yellow, and potassa bismuthic iodide gives a red precipitate inclining to crystallization.—Arch. f. Ph., July, 1879, pp. 1–7.

Theobromia—Quantitative Determination in Cacao and Chocolate.—G. Wolfram communicates the following method: 10 grams of shelled cacao beans previously rubbed in a hot mortar to a thick paste, or 20–30 grams of chocolate, are boiled in water for some time, and ammoniacal subacetate of lead is added in slight excess. It is then filtered hot, the filter washed with hot water, until a portion of the acidulated and cooled filtrate no longer gives even a trace of precipitate with phosphomolybdate of sodium. The washing takes place rapidly, and requires from 700 to 800 cc. of water. The filtrate, which is bright as water when the ammoniacal acetate of lead is in excess, is treated with solution of soda, evaporated to about 50 cc., acidulated strongly with sulphuric acid, and the lead sulphate filtered off. The filtrate is now treated with large excess of phosphomolybdate of sodium, the deposition of the slimy yellowish-white precipitate being facilitated by gentle heat and stirring. After several hours the cooled mixture is filtered, the precipitate is washed with a 6 to 8 per cent. solution of sulphuric acid, then transferred to a beaker, treated with caustic baryta to strong alkaline reaction, heat being applied to facilitate the reaction. The excess of barium hydrate is neutralized with sulphuric acid, a possible excess of the latter by barium carbonate, and the liquid is then filtered hot, and the filter washed with hot water. The filtrate is now evaporated to dryness in a platinum capsule, and weighed. Containing, however, always a small quantity of barium salts, the mixture is heated to redness until the alkaloid is completely dissipated, and again weighed. The difference between the two weighings is the theobromia.—Ph. Centralb., February 13th, 1879, p. 64.

Phosphate of Berberina—Preparation and Composition.—Henry B. Parsons and Theo. J. Wrampelmeier have made some interesting experiments on the preparation and composition of phosphate of berberina. By heating together a given weight of sulphate of berberina and of an excess of acid phosphate of cal-

cium, double decomposition takes place, soluble phosphate of berberina and insoluble sulphate of calcium being formed. The mass, being evaporated nearly to dryness, is treated with hot diluted alcohol, the solution is filtered from sulphate of calcium, evaporated nearly to dryness, and treated with cold stronger alcohol, when the phosphate of berberina separates as a canary-yellow flocculent powder, which is dried at a low heat. The salt thus made is very readily and freely soluble in cold water, a little less soluble in cold diluted alcohol, more freely in hot diluted alcohol, sparingly soluble in cold stronger alcohol, more soluble in it when heated, and not sensibly soluble in absolute ether or chloroform. It may be obtained in irregular prismatic crystals by crystallizing from a hot, concentrated alcoholic solution. These crystals do not absorb water as readily as does the loose powder, which, though readily absorbing water, does not deliquesce, but its color is changed from a canary to an orange yellow. From their analysis the authors deduce the formula for phosphate of berberina to be: $C_{20}H_{17}NO_4, 7H_3PO_4, 4H_2O$.—New Rem., August, 1878, pp. 226–228.

Crystallized Phosphate of Berberina.—Mr. Henry B. Parsons has had opportunity to analyze a handsomely crystallized sample of phosphate of berberina prepared by Mr. Gerge E. Willmarth, and following the course of analysis pursued by Mr. Wrampelmeier, obtained figures which lead him to the formula $C_{20}H_{17}NO_4, 2H_3PO_4$. The salt is in beautiful canary-colored crystals, which are very freely soluble in cold water, and moderately soluble in strong alcohol. Mr. Willmarth describes the process for its preparation as follows: The properly powdered root of *Hydrastis canadensis* was exhausted with water, the liquid evaporated to a good, firm extract, this extract treated with alcohol of 95 per cent., filtered, the alcohol recovered by distillation, and the residue dissolved in a small amount of distilled water. To the clear liquid thus obtained was added a large excess of P. & W.'s dilute phosphoric acid, the liquid concentrated on a water-bath, and set aside for twenty-four hours, when crystals were formed, which were washed free from acid with 94 per cent. alcohol and recrystallized from hot alcohol of the same strength.—New Rem., April, 1879, p. 109.

Beberia.—Considerable uncertainty as to the proper formula for this alkaloid has always existed, owing to the fact that hith-

erto no crystalline salt has been obtained. Mr. D. B. Dott, however, has now succeeded in preparing a crystalline hydrochlorate, from the examination of which he hopes to ascertain the composition of the base. This crystalline hydrochlorate may be prepared in a variety of ways, among others by the following process: The ammonia precipitate of the Br. Pharm. process is extracted with ether, the ether distilled off, and the residue dissolved in water with hydrochloric acid. From this solution by fractional precipitation the base is obtained of a grayish-white color. When this is dissolved in excess of dilute hydrochloric acid, and the solution allowed to evaporate at the ordinary temperature, crystals will gradually make their appearance, generally after some days. The solution ought not to be neutral, as in that case it is apt to form a gelatinous mass. The largest crystals were obtained, however, from an almost neutral solution. Even with these the form was only discernible under the microscope, when they were seen to consist of very long four-sided prisms. The crystalline magma, formed as above described, should be freed from mother waters by pressure, and the remaining muriate by recrystallization may be obtained perfectly white. This salt possesses in a marked degree the sweet-bitter taste formerly noticed by Dr. Maclagan. The alkaloid precipitated from it is free from color and may be assumed to be pure.—Yearbook of Pharm., 1878, p. 514.

Salicylate of Physostigmina—(Eserin).—The observation that the aqueous solutions of salicylates of other alkaloids possessed good stability, led Mr. F. Merck to the conjecture that a compound of salicylic acid and physostigmina might also prove stable. The result proved the correctness of this view, and he has now produced the compound not only in a condition of stability, but also of great purity. Salicylate of physostigmina forms colorless, glistening, needle-shaped, or short columnar, apparently rhombic crystals. It is readily soluble in 24 parts of absolute alcohol, while at the ordinary temperature 130 parts of water are necessary for its solution. Nevertheless an aqueous solution, prepared with hot water in the proportion of 1:50, remains clear after cooling for weeks. In substance the compound keeps unchanged when exposed to light, but its solutions must be kept in the dark, though they will not be reddened when exposed to diffused light until after one or two days' standing. The compound contains 83.4 per cent. salicylic acid, which accepting Hesse's formula for

eserin, would lead to the formula $C_{15}H_7N_3O_2$, $C_7H_6O_2$.—Ph. Centralh., June 5th, 1879, p. 226; from Zeitschr. Est. Ap. Ver., 15, 1879.

Emetia.—*Separation from Deposits in Wine of Ipecacuanha*.—Mr. George Brownen, having a considerable quantity of deposits which had accumulated from wine of ipecacuanha, has endeavored to utilize them, and finds the following modification of Pelletier and Dumas's method to yield a fair return of emetia. The semicrystalline mass was made into a paste with water, and then mixed with calcined magnesia until a marked alkaline reaction was obtained. After standing 24 hours the mixture was slightly warmed to complete the reaction, and the resultant mixture spread in thin layers, and dried as rapidly as possible at a low temperature. The mass was next reduced to powder, and percolated with spirit of wine. The alcohol was removed by evaporation, the impure emetia dissolved in dilute acetic acid, and then precipitated by ammonia. The tolerably pure emetia, so obtained, was fawn-colored, completely soluble in acids, and precipitated by Sonnenschein's and other alkaloidal tests.—Yearbook of Pharm., 1878, p. 557.

Pelletierina.—Mr. C. Tanret, since announcing the discovery of this liquid alkaloid in pomegranate bark (see Proceedings, 1878; p. 280), has determined some additional characters. The alkaloid is obtained in a pure state by distilling its ethereal solution in a current of hydrogen, and maintaining the residue at a temperature of 130° to 140° C. ($=266^{\circ}$ to 293° F.) until it no longer gives off the vapor of water. The temperature is then raised, and the liquid collected that distils between 180° and 185° C. ($=356^{\circ}$ and 365° F.). It is so obtained colorless, but in the open air or in flasks incompletely filled it becomes colored very rapidly. Its specific gravity is 0.999 at zero (32° F.) and at 21° C. ($=69.8^{\circ}$ F.) it is 0.985. It is very soluble in water, with which it undergoes a contraction of volume, a mixture of 1 per cent. of pelletierina with 2.5 parts of water having at 21° C. ($=69.8^{\circ}$ F.) a specific gravity of 1.021. It is dextrogyrate, having in aqueous solution a rotatory power of $(\alpha)_j = +8^{\circ}$, that of the sulphate being $+5.9^{\circ}$. With sulphuric acid and potassic bichromate it gives a green color as intense as alcohol under the same conditions. Analysis shows its composition to be $C_8H_{13}NO$, and it therefore furnishes another example of a volatile oxygenate base near to con-

hydrina ($C_8H_{17}NO$) and *tropia* ($C_8H_{15}NO$). The results of physiological experiments made by several medical men have demonstrated that pelletierina is the tæni-fuge principle of the pomegranate.

Some experiments have been made in order to ascertain the amount of alkaloid contained in the bark from different parts of the plant, and the influence of vegetation upon its formation. The bark used was all taken from ten-year-old plants grown in Troyes, in the open air during the summer, and in a greenhouse in winter. The results obtained, therefore, are considered to be comparable between themselves, although plants grown entirely in the open air under a warmer sky might yield different quantities of the alkaloid. The following figures show the yield in sulphate from 100 parts of bark.

	Gathered June 10.	Gathered August 3.
Fibrillæ, entire, dry,	—	1.80
Bark of fibrillæ, obtained by contusion, dry, .	0.66	2.25
Meditullium of fibrillæ, dry,	—	0.68
Bark of roots larger than a pigeon's feather, fresh,	0.60	0.92
" " " " dry,	1.20	1.54
Bark of large and medium-sized branches, fresh,	0.34	0.37
" " " " dry,	0.68	0.66
Bark of small branches, dry,	0.32	—

—Ph. J. Trans., November 30th, 1878, p. 450 ; from Compt. Rend., 87, p. 358.

Alstonina.—Barron F. Von Müller and L. Rummel communicate the following information regarding this alkaloid, obtained from the bark of *Alstonia constricta*, F. V. M. The alkaloid is obtained by treating the alcoholic extract of the bark with water and a little hydrochloric acid, adding to the filtered solution a small excess of ammonia, dissolving the separated flocks in ether, and evaporating the ethereal solution. The alkaloid then remaining is purified by again dissolving in dilute acid, and repeating the above process. Alstonina is an orange-yellow, brittle, pellucid mass, of very bitter taste ; it melts below $100^{\circ} C.$ ($= 212^{\circ} F.$), and is carbonized at a higher temperature ; dissolves easily in alcohol, ether, and dilute acids, sparingly in water. All its solutions in the dilute state exhibit a strong blue fluorescence, which is not affected by acids or by alkalies. Its alcoholic solution has a slightly alkaline reaction. It combines with acids, but does not completely neutralize them. Hydrochloric and other strong acids,

also alkalies, decompose it partially on evaporation on a water-bath to a dark-colored, viscid acid substance. The hydrochlorate gives precipitates with the chlorides of platinum and of mercury, mercurio-potassic and bismutha-potassic iodides, biniodide of potassium, phosphomolybdate and phosphotungstate of sodium, bichromate of potassium, picric acid, the alkalies, and with alkaline carbonates. Its hydrochlorate is not precipitated by tannic acid, which, however, gives a precipitate with the acetate or with the pure base. Concentrated nitric acid dissolves alstonina with crimson color, becoming yellow on warming; sulphuric acid with reddish-brown color, changing to dirty green; hydrochloric acid forms a yellowish solution.

Alstonina differs from *ditamina* chiefly by its behavior towards concentrated acids and by its fluorescence, which has not been recorded for the other alkaloid.—J. Chem. Soc., January, 1878, p. 31.

Duboisina.—This volatile alkaloid, obtained from the leaves and twigs of *Duboisia myoporoides*, R. Br., is regarded by Baron F. Von Müller and L. Rummel as probably identical with the *piturina* found by Staiger in *Duboisia Hopwoodii* (see Pitary in this Report). It is prepared like nicotina, and is a yellowish oily liquid, lighter than water, of a strong narcotic odor, resembling that of nicotina and of cantharides; has a very strong alkaline reaction, and neutralizes acids completely; dissolves in any quantity of ether, alcohol and water; throws down ferrous oxide from ferrous sulphate; dissolves without color in concentrated acids. Its hydrochlorate, which is a deliquescent salt when greatly diluted with water, is precipitated by biniodide of potassium, by potassio-mercuric and potassio-bismuthic iodide, and by tannic acid, but not by any other of the usual alkaloid reagents.

Nicotina, which *duboisina* resembles, is distinguished from the latter by its specific gravity, its less powerful odor, and by its hydrochlorate; and by being precipitable in diluted aqueous solution by phosphomolybdate of sodium, picric acid, and chloride of platinum.—J. Chem. Soc., January, 1879, p. 32.

Anthocercia.—*Alkaloid of Anthocercis Viscosa*.—The poisonous character of Australian species of *Anthocercis* has led Baron F. Von Müller, in conjunction with Mr. L. Rummel, to subject the leaves and branches of *Anthocercis viscosa* from Western Australia to examination. By methods well understood the authors

obtained a small percentage of a volatile alkaloid, for which Baron Von Müller proposes the name anthocercia, and which he describes as follows: Anthocercia forms a yellowish liquid of the consistence of fixed oils, heavier than water, bitter and peculiar taste, and pleasant odor; with hydrochloric and acetic acids it forms cloudy condensations; it is but sparingly soluble in water, but easily in alcohol or in ether; it gives a distinct blue reaction with litmus. Concentrated sulphuric acid dissolves it with yellow-brown color, which changes to violet on addition of permanganate of potassium; concentrated nitric or hydrochloric acid dissolves it with a straw-yellow color. Solutions of acetate of anthocercia give precipitates with tannic, picric, phosphomolybdic, and phosphotungstic acids, with potassio-bismuthic and potassio-mercuric iodide, iodo-iodide of potassium, the chlorides of gold, platinum, and mercury, the free and carbonated alkalies, and, to a less degree, with nitrate of silver. Neither ferric chloride, chromate of potassium, or iodide of potassium affect the solutions of the alkaloid. The alkaloid is evidently highly poisonous.—*Zeitschr. Oest. Ap. Ver.*, June 10th, 1879, p. 257.

Sparteina.—Mr. E. Merck has prepared a large quantity of this alkaloid, discovered by Stenhouse in broom (*Sarothamnus scoparius*), and has submitted some of it to Dr. F. Von Müller for therapeutic experiment (see also *Scoparin*). *Sparteina* occurs in broom in small and very variable quantities. In its pure condition, and freshly prepared, it is an almost colorless and oily liquid, which, when exposed to the light and air, rapidly becomes colored yellow to brown. It possesses a peculiar smell, recalling that of hyoscyamia, and a bitter taste. It has no action on the pupil of the eye. It is insoluble in water, but dissolves in alcohol. It gives characteristic alkaloid reactions, has strongly basic properties, and forms, with acids, crystallizable salts readily soluble in water. Of these the author has prepared the sulphate in the form of a white powder, distinctly crystalline under the microscope, which form he considers best for medicinal use, although there is no difficulty in preparing larger crystals, even to one centimeter in length. The crystals belong to the monoclinic system, apparently. Pure *sparteina* being a very sensitive and alterable body, the author thinks the sulphate will be found more suitable for administration. Although the experiments with the salt have not been numerous, they have shown that neither its internal nor subcutaneous administration produces unpleasant

accidents or smarting, whilst its diuretic action was considerable. An aqueous solution was used of the strength of 1 part of sulphate of sparteina to 50 parts of water, and of this the internal dose was 30 drops ($= 0.04$ gram of the salt), and the subcutaneous dose 1 gram ($= 0.02$ gram of the salt).—Ph. J. Trans., June 28th, 1879, p. 1060; from Heilbronner Memorabilien, 1878, No. 12.

A New Organic Base in Animal Organisms.—P. Schreiner draws attention to a new base which occurs in various parts of the animal system, both in a morbid and in a normal condition. It evolves ammonia on treatment with soda; with chloride of zinc it gives a white flocculent precipitate, soluble in hydrochloric acid. With auric chloride it yields an immediate gold-colored precipitate, which gradually becomes crystalline. With solution of tannin there is formed a white flocculent precipitate; with silver nitrate a white flocculent precipitate, soluble in ammonia, and in nitric, sulphuric, and acetic acids. Iodide of potassium produces no change, and plumbic acetate, whether neutral or basic, occasions no precipitation—Liebig's Annal., vol. 194, No. 1; in Chem. News, November 15th, 1878, p. 244.

Potomin—Alkaloid from Cadavers.*—Professor Selmi has searched for and found a volatile alkaloid in cadavers which had been buried for one, two, six, and over six months. The alcoholic liquids in which the intestines from the first three and the products of putrefaction of the fourth cadaver had been placed, were acidified with sulphuric acid, and subjected to distillation in a current of hydrogen. The fatty matters were removed from the residue in the retort by filtration, and this was then treated with subacetate of lead, the lead precipitate removed by filtration, the excess of lead in the filtrate removed by sulphuretted hydrogen, and the pale-yellow liquid concentrated. The thick liquid was now treated with baryta, whereby ammonia was given off, and the residual mass shaken with ether, which, upon evaporation, yielded the alkaloid. It had a specific odor, and acrid, but not bitter taste. Injected into the jugularis of frogs and rabbits, it neither produced death nor even signs of toxication.

* Dr. Hager remarks that this in all probability is the already known *septicin* (see Proceedings, 1875, pp. 434–486). It is remarkable that Professor Selmi should have been unacquainted with the observations of Marquardt, Zuelzer, and Sonnenschein, Schwanert, Dupré, and others.—Rep.

Doctors Morrigia and Battisteni have since made experiments in the same direction, but, in contradiction to Professor Selmi's experiments, find that the human cadaver contains highly toxic substances, which may be extracted by amylic and ethylic alcohols.—Ph. Centralh., July 4th, 1878, p. 251.

H. Van Gelder has recently had opportunity to examine various organisms of two cadavers for the alkaloid which Marquardt, Hager, Liebermann, and others have described under the name of *septicin*, and which is supposed to be a product of animal putrefaction. In both cases the alkaloid was found to correspond in its characters with those given by Liebermann. It is precipitated from its aqueous solutions: White, by potassio-mercuric iodide; dark brown, by iodo-iodide of potassium; white, by tannic acid, by chlorine-water, and by mercuric chloride; yellow, by phosphomolybdic acid; brown, by platinic and by auric chloride. No color-reaction is produced with conc. sulphuric acid, or by cold conc. nitric acid; but the latter produces a yellow color when heated. The method for its isolation was that known as Stas-Otto's. In the case of one of the cadavers, the kidney and liver contained a larger proportion than the stomach and intestines. None was found in the blood, which, however, contained some quinia which had been taken several days before death.—Arch. f. Ph., April, 1879, p. 331.

Cadaver-Poison of the Australian Natives. — According to Taplin, the inhabitants of the Lower Murray district of Australia, who are comprised under the name of Narrinjeris, make use of a most destructive poison for killing their enemies, namely, the specific animal poison developed in human cadavers. The natives state that the knowledge of this poison has been communicated to them by the inhabitants along the Upper Murray; and it has at present become a most destructive weapon in the hands of the natives, who adopted it with so much more eagerness as their former belief in charms is gradually dying out among the present generation. The practice is very much facilitated by the fact that the natives do not bury their dead, but preserve them above ground. Into such a corpse the point of a spear, consisting of a sharp-pointed piece of human bone six to eight inches long, is inserted. Then a bunch of hair or feathers is saturated with the fat of the decomposing body, and tied about the pointed bone. This apparatus is the *nieljeri*. With it the murderer stealthily ap-

proaches his victim, slightly scratches the skin with the sharp poisoned point, and, if undetected, as often happens in consequence of the narcotic sleep of the natives after one of their gigantic meals, he steals away unsuspected. Soon the terrible effects of the cadaveric poisoning make their appearance, and the person generally dies under the most excruciating pains.—*New Rem.*, August, 1878, p. 234.

Anilin, Rosanilin—Attempt to form Alums.—Mr. W. H. Wood has endeavored to prepare alums containing anilin and rosanilin. The analogy existing between the combinations formed by ammonia, methylamin (considered as a type of the primary monamines of the methyl series), and anilin are well known. It was, therefore, considered a subject of sufficient theoretical importance to determine whether the parallelisms existed with respect to the formation of alums containing anilin. The author's experiments, which are given in some detail, show that neither anilin sulphate nor rosanilin sulphate are capable of forming alums, either with aluminium, iron, chromium, or manganese. They show that the crystals formed with alumina sulphate are, in all cases, the sulphates of the alkaloids containing some alumina sulphate as impurity, and that the same is probably true if Cr, Fe, or Mn are substituted for Al, although no direct experiments have been made on this point.—*Ch. News*, July 5th, 1878, p. 1.

Hydrochlorate of Rosanilin (Fuchsin)—Therapeutic Applications.—It is stated that Dr. Feltz has used this anilin compound, known in commerce under the name of "fuchsin," with success in several cases of albuminuria. Bouchut has now made further experiments which fully confirm the results of Feltz. He reports ten cases treated in the Children's Hospital, in which by its use cures were effected in from five days to five months. The daily dose administered by Bouchut did not exceed 0.5 gram, but other physicians have given it in doses up to 1.0 gram per day. It is given in form of mixture composed as follows: Gum arabic, 10.0; hydrochlorate of rosanilin, 0.2 to 0.5; dissolve in syrup of gum, 30.0; orange-flower water, 10.0; distilled water, 100.0; add essence of peppermint, 2.0 (or tincture of star anise, 5.0). The diet during the treatment consists of milk, cold and warm, occasionally aromatic chocolate, acorn coffee, bread and butter, etc.

Hydrochlorate of rosanilin is with difficulty soluble in water, readily soluble in alcohol, and insoluble in ether. Inasmuch as

the commercial article often contains arsenic, it must be carefully tested for that substance before it is applied as a medicine.—Ph. Centralh., May 8th, 1879, p. 190; from Rép. de Pharm., No. 4, 1879.

Quinone.—*Preparation*.—R. Nietzki gives the following process: Powdered bichromate of potassium is added to a cold mixture of 1 part of anilin, 8 parts of sulphuric acid, and 30 parts of water, until the precipitate of anilin black, which is first formed, redissolves, giving a brown solution. About $2\frac{1}{2}$ parts of the bichromate are required for this purpose. If the process is now interrupted by the addition of a sulphite, hydroquinone is obtained, but in order to obtain quinone it is necessary, after adding a further quantity of bichromate (1 part), to leave the mixture at rest for some hours, and then heat it to 35° C. ($= 95^{\circ}$ F.). The quinone is extracted by agitation with ether, 68 per cent. of the theoretical yield being obtained from the ethereal solution in golden scales, which generally contain traces of hydroquinone. The mother liquors from the quinone can be worked up for hydroquinone. *Toluquinone* can be prepared from ortho-toluidin by a similar process.—Ber. d. d. Ch. Ges., 9, pp. 1102–1104; in J. Ch. Soc., October, 1878, p. 794.

Phenolphthaleïn.—H. C. Vielhaber has found that the bicarbonates of the alkalies are without action upon this substance, which Luck has recently recommended as indicator in the titration of alkalies and acids. His attention was drawn to this when determining the strength of acetic acid by means of bicarbonate of potassium. The use of bicarbonates when titrating acids with phenolphthaleïn as indicator must therefore be avoided.—Arch. f. Ph., November, 1878, p. 410.

Phenolphthaleïn.—*Application as Indicator in Alkalimetry*.—Mr. Charles W. Drew draws attention to this new compound, discovered several years ago by Baeyer, which he finds to be a valuable indicator in alkalimetry. The neutral and acid solutions of this substance are entirely colorless, and by the faintest excess of alkali an intense carmine color is developed. The color is discharged with equal readiness by the addition of sufficient acid to render the solution neutral in reaction. The mere fact of the transition from a colorless solution to one of a high color, gives it a great advantage over any of the test solutions in common use, and to this he adds, that for delicacy, tenuity, and quickness

of response to infinitesimal amounts of acids or alkali, it is immeasurably superior to them all. The reaction is evident in solutions containing $\frac{1}{2000000}$ part of the substance to be examined, and 1 part of phenolphthaleïn in 2,000,000 parts of solution gives with excess of alkali a distinct pink coloration. The color developed by alkalies is discharged by all acids, including carbonic, hence it is, like litmus, unfitted for use in the titration of carbonates in the cold.

It is used by dissolving 1 part in 100 parts of 20 to 25 per cent. alcohol, 4 or 5 drops of which are ample for 50 to 100 cc. of the solution to be titrated.—A. J. Ph., November, 1878, p. 513.

Trimethyl-Glyceramin.—Mr. Hanriot obtained this compound in the form of orange-colored tables, belonging to the orthorhombic system. These crystals, though anhydrous, effloresce in a dry vacuum from the loss of hydrochloric acid (the hydrochlorate? Rep.). They dissolve in cold water, and more freely in hot water, and are not decomposed on boiling as much as the impure salt. They are insoluble in alcohol.—Compt. Rend., May 2d, 1878; in Chem. News, July 5th, 1878, p. 8.

GLUCOSIDES, ETC.

Phlorizin—Description of Phlorose.—Dr. O. Hesse obtains the sugar—*phlorose*—by acting on phlorizin with sulphuric acid according to Schiff's method. The carefully purified substance gave on combustion results corresponding with the formula $C_6H_{14}O_7$. Phlorose contains one molecule of water of crystallization, which is expelled with difficulty between 80° and 100° C. ($= 176^\circ$ and 212° F.); it melts at 74° C. ($= 165.2^\circ$ F.), and is as active as a reducing agent as glucose. The crystallized anhydride cannot be obtained from phlorose as is the case with glucose; another marked difference between the two is that phlorose only causes the plane of polarized light to rotate $\frac{1}{5}$ th as much as glucose.—Liebig's Annal., 192, pp. 173–174; in J. Ch. Soc., November, 1878, p. 851.

Glycyrrhizin—Characters and Composition.—Mr. J. Habermann had previously (see Proceedings, 1878, p. 612) described a nearly colorless crystalline body, which he obtained by dissolving commercial glycyrrhizin in hot glacial acetic acid and allowing the solution to cool. He has now subjected this body to further examination. On repeated crystallization from glacial acetic acid,

and several subsequent crystallizations from boiling strong alcohol, the substance was obtained pure in the form of faint-yellow brightly-glistening crystalline leaflets, which form with water a gelatinous mass, are insoluble in ether, and very sparingly soluble in absolute alcohol. The aqueous jellylike mass leaves on evaporation an amorphous, brittle, gumlike mass. Upon addition of ammonia or caustic alkali to water it is rendered extremely soluble. The substance is evidently an acid compound of glycyrrhizic acid with ammonia, the analytical results leading to the provisional formula $C_{44}H_{63}NO_{16}NH_4$. The neutral ammonium and potassium salts, containing 3 mol. of the base to 1 mol. of the acid, and the barium and lead salts, containing 3 mol. of the base to 2 mol. of the acid, were prepared by the author. The glycyrrhizic acid exists in all probability in the root as neutral ammonium salt. The neutral potassium salt, when treated with glacial acetic acid, forms, like the ammonium salt, an acid salt containing 1 mol. of acid to 1 of base.

Glycyrrhizic acid is therefore tribasic, and forms neutral and acid salts. It may be obtained in the free state by suspending the lead salt in water, and decomposing with sulphuretted hydrogen. To the mixture egg albumen is then added to enable filtration. The colorless filtrate leaves the acid in the form of an amorphous, brown, sweet mass. The solution reddens litmus distinctly, decomposes the carbonated alkalies gradually on boiling, and reduces Fehling's solution by the aid of heat almost as rapidly as glucose.—Ph. Centralh., June 19th, 1879, p. 242; from Wien. Sitzungsber., October, 1878, in Ch. Centralbl., 19, 1879.

Naringin—(*Hesperidin*, *De Vrij*).—In 1857 De Vrij observed in the aqueous residue remaining after the distillation of oil of neroli from the flowers of *Citrus decumena* (in Java) an abundant crystalline deposit of a bitter principle, which, in the belief of its identity with the indifferent principle discovered in 1828 by Lebreton in oranges, he named hesperidin. Dr. Ed. Hoffmann afterwards showed the two principles to be distinct substances, and now gives some further characters of De Vrij's principle, which, upon the proposition of Professor Flückiger, he distinguishes by a new name,—*naringin*,—derived from the Sanscrit name for the orange—*naringi*. Mr. Hoffmann embraces in his present paper the unpublished observations of Dr. De Vrij relative to the preparation and properties of the bitter principle.

According to De Vrij *naringin* is contained in nearly all parts

of *Citrus decumena*, but is most abundant in the perfectly developed flower, which, when dry, contains as much as 2 per cent., while the undeveloped flower contains but 0.29 per cent. In the lower portions of Java, bordering on the sea, the plant produces a splendid and favorite fruit, but in the higher countries the fruit is worthless, while, to the contrary, the flowers are extremely abundant and odorous, a single tree yielding as much as 100 kilograms of fresh flowers, from which an oil is obtained by distillation which is in no respect inferior to that obtained in France and Italy. The aqueous portions of the residues of distillation in the still deposit upon cooling an abundance of naringin in the form of needle-shaped crystals, which require resolution in boiling water, treatment with subacetate of lead to remove coloring matter and tannin, and several crystallizations for their final purification. De Vrij obtained the principle in a perfectly white condition, resembling sulphate of quinia, by repeated solution in alcohol, precipitation by water, and final crystallization from hot acetic acid.

Naringin requires 300 parts of cold water for solution, but is soluble in all proportions of hot water, alcohol, and glacial acetic acid. It is insoluble in chloroform, ether, volatile oils, or benzol, melts at 100°C. ($= 212^{\circ}\text{F.}$), losing 14 per cent. of its water of crystallization, and when completely deprived of the latter melts at 171°C. ($= 340.8^{\circ}\text{F.}$). It has a pure bitter taste, and is lævo-gyrate. Its aqueous solutions are not precipitated by neutral acetate of lead, and by basic acetate only when in hot concentrated solution; ferric chloride colors even very dilute solutions brown-red; mercuric chloride and argentic nitrate do not occasion a precipitate; ammoniacal silver solutions are reduced; alkalis dissolve it with a yellow color, and acids again precipitate it from such solutions in crystalline condition, but, according to the period of their reaction, a greater or less quantity is decomposed into an intensely yellow product. Traces of this product adhere tenaciously to the naringin deposited by the acids, and cannot again be readily freed from it by crystallization, resembling in this respect hesperidin. With the metallic oxides it forms very unstable compounds; its compounds with the alkaline earths are precipitated amorphous from aqueous solutions, and lime-water, saturated warm with naringin, forms on cooling a jellylike mass. Dehn, who had also examined some of the substance sent by De Vrij from Java, found that by boiling dilute acids naringin was readily split into a crystalline body, not further examined, and

into hesperidin sugar. Dr. Hoffmann also finds it to be readily split by the action of dilute acids, but has not been able to extend his examination owing to the small quantity of substance received (from Professor Flückiger). He has determined, however, that it does not, like hesperidin, form protocathechuic acid when subjected to the action of melting potassium hydrate. Subjected to ultimate analysis he obtained numbers corresponding to the empiric formula $C_{28}H_{32}O_{12} + 4H_2O$.

Naringin is distinguished from other components of the Aurantiaceæ—hesperidin, limonin, murrayin—by its solubilities, melting-point, and coloration by ferric chloride. Its melting-point, however, is nearly identical with that of murrayin (obtained by De Vrij from the flowers of *Murraya exotica*), but murrayin produces a blue-green color with ferric chloride. From hesperidin it is distinguished by its bitter taste and solubility in water, hesperidin requiring 5000 parts of water, and forming a tasteless solution.*—Arch. f. Ph., February, 1879, pp. 139–145.

Chamælirin.—Dr. Francis V. Greene has continued the investigation of this substance. He finds that chamælirin, as previously obtained and described by him (see Proceedings, 1878, p. 189), forms with 10 parts of water a clear, syrupy solution, of a yellowish-brown color; on standing, however, it becomes turbid, and deposits a gelatinous matter, which, by appropriate experiments, proved to be a fatty acid. After filtering this off the last traces were removed by evaporating the solution to dryness, extracting the dry mass with ether, and then with absolute alcohol. The residue of evaporation from the latter solution formed a permanently clear solution with water, but being still slightly colored it was treated with animal charcoal, the mixture evaporated to dryness, and the dry mass extracted by boiling absolute alcohol, which, on evaporation, left the chamælirin in an almost perfectly white condition. Its concentrated solutions were pale yellow. In his previous paper (see as above) the author had pointed out some resemblance of chamælirin to "saponin." He has since undertaken a series of physiological experiments, which have shown in several particulars toxic effects precisely similar to those of saponin. Since saponin is generally stated to be insoluble in absolute alcohol, while chamælirin is readily taken up by that liquid, the difference in their solubility should identify

* See also the abstract of a paper by A. Hilger on Hesperidin in Proceedings, 1876, pp. 378–375.

the latter to be distinct from saponin; but Bley's statement that saponin is soluble in 400 parts of absolute alcohol rendered experiments necessary, which prove that saponin (prepared by Gehe & Co., of Dresden) is insoluble in absolute alcohol. Dr. Greene, therefore, believes chamælirin to be distinct from saponin. The author furthermore proves chamælirin to be a glucoside. When boiled with a 2 per cent. solution of hydrochloric acid the liquid becomes turbid, and a precipitate is quickly deposited, while glucose is evidenced in the solution. The new product, which the author proposes to name

Chamæliretin, was found to be a dull-white, somewhat resinous substance, friable, odorless, and tasteless; insoluble in water; more readily soluble in cold absolute alcohol than chamælirin, and retained in such solution on the addition of an equal volume of water, though deposited on the addition of more; readily soluble in ether. It gives a brown color, changing to an undecided purplish hue after a time, with conc. sulphuric acid, but neither nitric or hydrochloric acid produces any color reactions.

In addition to the chamælirin and the fatty acid above referred to, Dr. Greene mentions a free acid, glucose, starch, and iron-greening tannic acid as constituents of the root of *Chamælirium luteum*.

The physiological experiments made with chamælirin prove that it is a cardiac poison, and that it produces its toxic effect by virtue of a depressing influence on the pneumogastric centres, and likewise by more or less completely exhausting or paralyzing the heart muscle. It also possesses, in common with saponin, the remarkable property of immediately dissolving the red corpuscles when a small quantity, either in powder or aqueous solution, is added to the blood.—A. J. Ph., October, 1878, p. 465.

Scoparin—Renewed Attention to the Diuretic Properties of an old Popular Remedy, the Broom (Sarothamnus scoparius).—Mr. E. Merck was induced to prepare a quantity of the two bodies, scoparin and sparteina (see Alkaloids), discovered in the plant by Stenhouse in 1851, and to submit them to Dr. Frommüller for therapeutic experiment. Scoparin occurs in the form of a fine yellow powder, in which, under the microscope, isolated acicular crystals can be seen. It is sparingly soluble in cold water, more freely in boiling water, whilst it dissolves readily in alcohol and glycerin. With alkalies, on account of the weak acid properties of scoparin, no constant neutral compound can be obtained. The

best form for its administration is as a subcutaneous injection in doses of 0.03 to 0.06 gram. For this purpose it is dissolved in water either with the aid of glycerin or a trace of ammonia. 0.03 gram of scoparin, 1 gram of water, and a small addition of ammonia give a suitable solution; or, 0.06 gram scoparin, 0.75 gram water, and 0.25 gram glycerin. The ammoniacal solution causes the least pain. Whilst the above doses administered subcutaneously produced a strong diuretic action, when administered by the mouth to produce equal results the doses require to be increased to 0.5 and even 1.0 gram. This is possibly due to the sparing solubility, and may indicate the necessity of experiments in the direction of an ammoniacal solution for internal administration.—Ph. J. Trans., June 28th, 1879, p. 1060; from Heilbronner Memorabilien, 1878, Heft. 12.

Santonin—Adulteration with Boracic Acid.—Mr. Wm. Stevenson has had occasion to subject a sample of santonin, having the appearance of a pure article, to examination, and found it to contain a very large percentage of boracic acid; the composition being 38.7 per cent. santonin and 61.3 per cent. crystallized boracic acid, corresponding to 34.84 per cent. of anhydrous boracic acid and 26.46 per cent. water.—Ph. J. Trans., November 16th, 1878, p. 411.

Picrotoxin—Characteristic Reactions.—A. Ogliastro finds that if a small quantity of pure picrotoxin is dissolved in two drops of nitric acid at 1.4° and gently heated, an amorphous residue of a reddish-yellow color is obtained. If two drops of potassa are added a fine bright red is obtained, which, on heating, passes to the color of old blood. If 2 cc. of a one-half per cent. solution of picric acid are mixed with a 50 per cent. solution of potassa in the cold, nothing is observed but a yellow precipitate. On heating to a boil the precipitate dissolves, and the liquid becomes orange-colored. On cooling, small prisms of potassic picrate are deposited, and the liquid remains reddish-yellow. If the experiment is repeated with the addition of picrotoxin, the color of the solution becomes much deeper on boiling, and on cooling no crystalline deposit takes place, and the liquid remains intensely colored. If a little picrotoxin is placed in a capsule and mixed with four or five drops of concentrated sulphuric acid, a golden-yellow coloration is produced, which passes into a saffron-yellow; the picrotoxin dissolves, and on adding a little powdered bichromate of potassium a violet-green color, changing on dilution with water to a

clear yellowish-green solution is produced.—*Gazetta Chim. Italiana*, 1879, No. 3; in *Ch. News*, June 13th, 1879, p. 264.

Vanillin—Occurrence in Benzoin.—Chr. Rump has obtained vanillin from Siam benzoin, of which it is a constituent. See Benzoin.

Vanillin—Production from Oat-bran.—Eugene Serullas has discovered a method whereby vanillin may be prepared from oat-bran. The method appears to be dependent on oxidation.—*Ph. Centralh.*, April 24th, 1879, p. 175; from *Die Chemische Industrie*, 1879, p. 47.

COLORING MATTERS.

Chlorophyll—Action of Reducing Agents.—Mr. A. H. Church had prepared a quantity of crude chlorophyll from some dried and discolored beet-leaves. The product was of an unsatisfactory color, and after being left for some months had acquired an unpleasant olive-brown hue. He nevertheless finally concluded to subject it to some further experiments, with a view of determining its relation to the red pigment of beet-leaves. Accordingly, the dark mass of chlorophyll was mixed with four times its weight of zinc powder, and placed in the water-oven for an hour or two, preparatory to its subsequent distillation, when, much to his surprise, the green color was not merely restored, it became far more intense and characteristic in hue than the best samples of leaf-green the author had ever seen. The red fluorescence and spectral bands of its alcoholic solution were, moreover, those of the unchanged pigments. It would therefore seem that the gentle reducing action to which the pigment had been submitted when warmed with the metal in presence of moisture, had brought it back to the state in which it existed prior to its removal from the plant and exposure to the oxygen of the air. A considerable portion was subjected to distillation with the zinc, and some sand to prevent frothing. About 30 per cent. of an oily distillate was obtained, the less volatile portions of which solidified to a crystalline mass on cooling. Ether dissolves this distillate with a blue fluorescence; caustic soda solution does not appear to dissolve or affect it. It seems to be a mixture of not less than three substances, possibly hydrocarbons, but as yet not identified. The author continues his researches.—*Ch. News*, October 4th, 1878, p. 168.

Chlorophyll—Manufacture and Use.—Messrs. Secourt and Guillemore take the leaves of spinach, nettles, etc., and macerate them in water. The whole is then boiled in an equal weight of soda lye at 12.5° Baumé, and the liquid thus obtained precipitated with alum. The lake thus yielded is washed and pressed, and is then mixed with an equal weight of a soluble phosphate, an alkaline citrate, or a bitartrate, and then diluted with water down to 2° to 5° Baumé. This solution retains its color, and may be advantageously used for giving a green to preserved vegetables, etc.—Mon. Scient. Quesn.; from Chem. Indust. Bl., in Ch. News, July 12th, 1878, p. 24.

Indigo-blue—Synthesis.—In the series of operations which, according to a previous communication of Mr. Adolf Baeyer, lead from phenylacetic acid to indigotin, the last link—the conversion of isatin into indigotin—was unsatisfactory, both as regards the clearness of the process and the yield. The mixture of reagents, consisting of phosphoric trichloride, acetyl chloride, and phosphorus, used to effect the reduction of isatin, can act in various directions, and the product is by no means pure indigotin, but consists chiefly of indigo-purpurin. The action of phosphoric pentachloride upon acid amides to which isatin belongs, is the key to the problem. If isatin is heated gently with this compound a lively reaction sets in, hydrochloric acid being given off, and the mass taking a brownish-red color. On the addition of water, a brownish-yellow mass is separated, which is insoluble in carbonate of potassa, and in contact with caustic potassa is reconverted into isatin. This substance is doubtless the imido-chloride of isatin, and yields indigotin by reduction. If heated gently with yellow phosphorus the red color of the mass passes into green, and on the addition of water, indigo-blue is deposited after a short boiling. Or, if isatin chloride is dissolved in alcohol and treated with zinc powder and acetic acid, the same result ensues. Or the mass obtained by the reaction of phosphoric pentachloride upon isatin is washed first with water, then with carbonate of soda, and is lastly treated with an alcoholic solution of yellow ammonium sulphide. When boiled, the liquid turns green, and on the addition of water and repeated boiling it becomes blue. The yield is considerable.—Ber. d. d. Ch. Ges., No. 11, 1878; in Ch. News, November 22d, 1878, p. 253.

Nitroalizarin.—Caro has patented several processes for the preparation of the *alizarin orange*, resulting from the action of

nitric acid upon alizarin. The alizarin is spread out in a thin layer upon the floor of closed chambers, and is submitted to the action of vapors of nitric acid. Another method is to dissolve the alizarin in ether, glacial acetic acid, petroleum, or nitrobenzol, and to pass a current of nitrous acid through the solution; 20 parts of the solvent are employed to 1 part of alizarin, and the current of nitrous acid is kept up until it ceases to be absorbed. The coloring-matter is collected either by distilling off the solvent or by precipitation with an aqueous solution of potassa, and subsequent precipitation of the salt formed with an acid. When glacial acetic acid is used as a solvent, nitric acid of sp. gr. 1.38 must be added. Sulphuric acid of sp. gr. 1.840 may likewise be used as a solvent.—Mon. Scient. Quesn., July, 1878; in Ch. News, July 12th, 1878, p. 24.

Brown Alizarin.—Prudhomme finds that if this new product is fixed with ferricyanide of potassium or acetate of chromium, light shades, varying from a mode to a gray are produced. The heavy shades seem difficult to obtain. With alkaline reducing agents brown alizarin gives a red liquor, which, on exposure to the air, becomes covered with a blue scum. The dye seems identical with that which may be obtained by an alkaline reduction of nitroalizarin. If a solution of nitroalizarin in caustic soda is heated for a long time in presence of a stannous salt, or of the hydrosulphite of soda, the color becomes successively violet, blue, red, and is covered with a blue scum. The new color may be useful along with the red and blue alizarins, in substitution for dyes which require to be fixed with albumen.—Bull. de la Soc. Chim. de Paris; from Bul. de la Soc. Ind. de Mulhouse, in Ch. News, July 19th, 1878, p. 37.

Bixin—Preparation.—C. Etti obtains bixin as follows: 1.5 kilogram of commercial annato freed from leaves are digested in the water-bath with 2.5 kilograms alcohol at 80 per cent., to which 150 grams of soda ash has been added, the temperature being maintained at 80° C. (= 176° F.). The mass, which acquires a brown color, is rapidly filtered while hot, the residue pressed between heated plates, and again extracted with 1.5 kilogram of alcohol at 60 per cent. The filtrates from the first and second extraction are mixed together with the addition of half their volume of water, when a part of the sodium compound separates out on cooling, the more complete precipitation being effected on adding the needful quantity of a concentrated solu-

tion of soda. After standing for some days the precipitate, which is crystalline, is collected upon a cloth, and freed by strong pressure from the mother liquor. It is purified by recrystallization, and for this purpose it is dissolved in portions in an excess of alcohol at 60 per cent., at a temperature of 70° to 80° C. ($= 158^{\circ}$ to 176° F.), quickly filtered; the filtrate again diluted with water when cold as above described, and mixed with solution of soda. The deposit, after a few days, is collected upon a cloth, pressed, stirred up to a paste with dilute alcohol, and mixed with pure and tolerably concentrated hydrochloric acid till a distinctly acid reaction is obtained. The bixin now deposited is perfectly washed with water, pressed, and finally dried at 100° C. ($= 212^{\circ}$ F.).

For the preparation of the other coloring-matters of annato, the liquids filtered from the deposits of bixin sodium are employed. They are acidulated with HCl, when a red voluminous precipitate is formed, which is washed with water, pressed, dried at 20° to 30° C. ($= 68^{\circ}$ to 86° F.), ground to a fine powder, and extracted with ether till the liquid runs off only very slightly colored. On evaporation the ether leaves a reddish-black resinous mass, which has not been examined. The portion insoluble in ether is amorphous bixin. The author gives a detailed description of crystalline and of amorphous bixin.—Ber. d. d. Chem. Ges., No. 8, 1878; in Ch. News, July 26th, 1878, p. 48.

ALBUMINOIDS.

Albumen—Complete Separation from Animal Liquids.—The methods hitherto generally followed consisted in boiling the liquid, previously slightly acidulated. It is, however, known that it is impossible to effect the complete separation of albumen, under all circumstances, by this process. Dr. Franz Hofmeister has proved that the following method effects an absolutely complete separation: The albuminous liquid having first been deprived of as much albumen as possible by the ordinary process, the filtrate is then mixed with hydrated oxide of lead, boiled a few minutes, and again filtered. The liquid is deprived of lead by sulphuretted hydrogen, and the excess of the latter is removed by boiling. The residuary liquid will then be absolutely free from albumen.—New Rem., November, 1878, p. 339; from Zeitschr. f. Physiol. Chem., II, 288.

Albuminate of Iron.—Dr. E. Holdermann has undertaken a series of experiments with a view to determine, 1. Under what conditions the precipitate is formed when solutions of albumen and of ferric salts are mixed, and in what respect the relative acidity of the latter may affect the product. 2. Whether the compound formed is definite in its constitution, and can be isolated in a chemical sense. 3. What influence is exerted by the chemical nature of the acid in the ferric salt employed, and what are the relations of the ash to the percentage of iron contained in the different compounds?

It is not necessary to give the details of the author's experiments, which are best studied in the original. The results may be briefly stated to be as follows:

1. A simple stoichiometrical relation of the two reacting substances could not be determined. If ferric chloride and albumen solution are mixed, an excess of the ferric compound will effect the resolution of the precipitate first formed. If, on the other hand, albumen is added to a very dilute solution of ferric chloride, a decided magma is formed, which is soluble in a *very large excess* of albumen. But if the alkalinity of the albumen has been destroyed by the addition of a few drops of hydrochloric acid, no precipitate is produced in the ferric solution; and if the alkalinity of the albumen is increased by the addition of a small quantity of potassa the precipitate will dissolve with less excess of albumen solution than without such addition. Acidification of the ferric solution prevents the formation of a precipitate. Addition of soda solution to the ferric solution to beginning of precipitation causes the solution to form the largest obtainable precipitate, which is insoluble in excess of the precipitant.

2. The composition of the precipitates produced is not sensibly changed by washing with water; the chemical composition must, therefore, be constant under identical conditions.

3. The nature of the acid appears to influence the percentage of iron in the ferric albuminate very materially. The compounds obtained under the same conditions with different ferric salts—chloride, sulphate, acetate, citrate, etc.—contain very variable proportions of iron.

4. The nature of the acid also affects the condition of the residue of heating to redness, since a portion of the acid enters into the composition of the precipitate. In the case of sulphate it is greater than the quantity of ferric oxide, while in the residues of

heat containing combustible or volatile acids the quantity corresponds well with the ferric oxide.

5. The degree of acidity of the ferric solution appears to affect the percentage of iron in the precipitate in so far that basic ferric salts produce precipitates containing a higher iron percentage than those produced by neutral or acid solutions. But whether this is due to the precipitation of ferric oxide as such, or whether the latter is capable of combining with the albumen in various proportion, is not yet determined. Neither does the author feel justified to speak of a ferric albuminate as isolated in a chemical sense.—Arch. f. Ph., August, 1878, pp. 149–160.

Milk—Analysis.—A. Adam recommends the following simple method: A glass tube of 40 cc. capacity, closed at the upper end by a cork, blown to a bulb in the middle of its length, narrowed at the lower end, and provided with a stop-cock, being the only specially constructed apparatus necessary. Into this are introduced 10 cc. of 75° alcohol containing 0.5 per cent. of caustic soda, 10 cc. of neutral or neutralized milk, and 12 cc. of pure ether. The cork being inserted, the mixture is shaken, and allowed to stand five minutes. Two well-defined layers are almost immediately formed, the upper being clear and containing the butter, while the lower is opalescent, and contains the lactose, casein, and salts. The lower layer is removed until 1 cc. remains, the mixture is again shaken, allowed to rest, and the remaining 1 cc. then drawn off. The solution of butter is drawn into a porcelain capsule, the tube washed with a little ether, the liquids evaporated to dryness, and weighed as butter; 0.01 gram being deducted for casein. The liquid containing the lactose, etc., is diluted to 100 cc., 10 drops of acetic acid are added, and allowed to stand five minutes; the casein is then separated, collected on a filter, washed with distilled water, pressed, dried and weighed. The filtrate now contains lactose, the natural salts, and acetate of sodium introduced during the process. A certain volume is treated with Fehling's solution to ascertain the quantity of lactose. Another volume is evaporated to dryness, and weighed; the dry mass is then incinerated and again weighed. In this way the lactose is determined by difference, as is also the quantity of salts. From the latter the carbonate of sodium introduced as soda must be deducted.—Ph. Centralh., November 14th, 1878, p. 437.

Milk—Determination of Solids.—H. Bering places about 0.09 gram of calcined magnesia in a small platinum capsule, deter-

mines the tare, and introduces carefully, without touching the sides, an accurately weighed portion of the milk (1 to 2 grams). On evaporation over a small open gas flame, placed about 40 centimeters below the capsule, the sample is obtained perfectly dry in from two to three hours. That the dried mass is very feebly hygroscopic appears from the fact that 0.214 gram, after standing for twenty-four hours in a half-wet room, had not gained 0.004.—Correspondenzblatt der Ver. Anal. Chem., April 1st, 1879; in Ch. News, June 13th, 1879, p. 264.

Milk—Simple Methods of Determining its Sugar.—When milk is mixed with soda solution and allowed to stand twenty-four to twenty-eight hours at the ordinary temperature, the mixture separates into a clear red liquid and a yellowish-white coagulum, composed of casein and fat. The red color is produced more rapidly on boiling, and is dependent on the milk sugar, the intensity of color being greater or less according to the quantity of sugar present. Upon this property of milk sugar R. Gescheidlen bases a colorimetric method for its quantitative determination. For this purpose a normal solution is first prepared by boiling a solution of sugar of milk containing 4 or 5 per cent., or milk containing a known quantity of the sugar, with an equal volume of solution of soda (of about 20 per cent.) for two to three minutes, and filtering the liquid through asbestos. 10 cc. of the milk to be examined are now treated in the same way; after which 1 cc. of each of the filtrate is diluted with 4 cc. of water, and the color of the two solutions compared in the usual manner; more water is added to the darker liquid until the color of both is identical. From the data obtained the quantity of sugar is readily calculated. Another method consists in determining the sugar, after treatment with solution of soda, by the aid of the spectroscope provided with Viciordt's attachment.—Ph. Centralh., August 1st, 1879, p. 290.

Fermentation.—Berthelot has recently published some interesting memoranda of the late Claude Bernard, the results of experiments made during the last months of his life, upon the nature of the fermentation process, which conflict decidedly with the well-known observations of Pasteur, and though the experiments were not concluded, the general interest pertaining to the subject justifies their present publicity. These results are condensed as follows:

1. The ferment exists fully developed in the interior of fermentable bodies, and is not introduced by the surrounding air, in which, indeed, no ferment can be detected.

2. The ferment is separated from organized cells as soon as they have attained a certain state of maturity; it is soluble, and acts like diastase, in so far as the substances in contact with it are split into simpler substances.

3. The presence of air is necessary to the life of the ferment; it requires the atmospheric oxygen taken up by the liquid for its development and maintainance.

4. The oxygen has not only to maintain the life-process of the ferment, but it also occasions the combustion of the alcohol produced during the process of fermentation, and thereby generates the heat necessary to the animal or vegetable life-process.

Claude Bernard is believed to have determined by his experiments that alcohol is generated by exposure to air, as well as when it is excluded, without yeast; that fermentation takes place in the juice of unripe as well as of rotten grapes only after the addition of a ferment, notwithstanding they contain sugar; and that alcohol is formed in ripening and rotting fruits by the action of a soluble ferment, but that, under these conditions, no yeast formation takes place.—Ph. Centralh., January 16th, 1879, p. 21.

Mr. L. Pasteur has made a critical examination of the above-mentioned posthumous work of Claude Bernard, and sums up his memoir as follows: The manuscript of Bernard is merely a sterile attempt to substitute the deductions of an ephemeral system for well-established facts. He remarks that if M. Berthelot had not been himself biassed by preconceived ideas, the work of the late illustrious physiologist would not have seen the light in its present form. Bernard's fundamental doctrine is the essential opposition between phenomena of vital creation or of organizing synthesis and, on the other hand, phenomena of death or of organic destruction, to which latter general type the actions of fermentation belong. Pasteur, on the contrary, maintains that under certain conditions there appear acts of fermentation in direct correlation with organic acts. Bernard's especial conception was that of soluble non-organized ferments, and he often declared that it was necessary to liberate fermentation from the vitality of the cellules.—Compt. Rend., November 18th, 1878; in Chem. News, December 13th, 1878, p. 287.

P. Miquel's experiments and observations support the views advanced by Pasteur, that the atmosphere is the carrier of all ferments. Mr. Miquel's experiments were made in the wine-growing districts of Southern France. When grape-juice, expressed in the month of September, and sterilized by boiling, was introduced into vessels that were perfectly free from fungous germs, fermentation invariably and regularly took place. According to the author's observations, certain insects at this period act as carriers of the ferment-germs; if the approach of these is prevented mould will frequently form, but no fermentation occurs, not even when the air, which is loaded with innumerable germs of microbes, is freely admitted. Accordingly, it is an error if all kinds of spontaneous alcoholic fermentation are attributed to the dust-elements of the air. On the other hand, however, it can easily be shown that air in motion really transports alcohol ferments. Of 82 sealed flasks, containing from 250 to 300 cc. of sterilized grape-juice, which were opened and then again sealed, 3 showed regular alcoholic fermentation; in the first, fermentation was produced by an elliptic ferment; in the second by a round but very active ferment; and in the third by *mucor*, the granules of which often measured 0.037 mm. Of 11 flasks, each containing 1 liter of the juice, 2 showed active fermentation under the same treatment, the ferment being in both round. 20 flasks, which, for comparison, were filled with filtered air, showed no change during the same period.

The alcoholic ferment is, therefore, contained in the air, and, in the region where the author's experiments were made, in great abundance. When the above experiments were repeated in the Park of Montsouris, in Paris, spontaneous fermentation occurred only in one instance.—Pharm. Centralh., February 13th, 1879, p. 61.

Yeast—Chemical Composition.—Nægeli and Loew have subjected beer-yeast to chemical examination. When the well-washed yeast is completely freed from adhering water by drainage on a filter for several hours, it loses in drying at 100° C. (= 212° F.) 83 per cent. of its weight.

Bottom yeast (untergährige Bierhefe), containing 8 per cent. of nitrogen, was found to have the following composition :

Cellulose. with vegetable mucilage (constituting the cellular tissue), 87
 Protein substances:

a. Common albumen,	86
b. Readily decomposable, gluten-caseinlike protein substance, .	9
Peptone, precipitable by subacetate of lead,	2
Fat,	5
Ash,	7
Extractive matter, etc.,	4
	<hr/>
	100

The fat is mainly composed of elain. Among the 4 per cent. of residual matters the authors have found extractive matters that are not precipitable by subacetate of lead, and among these a peptonelike body; they have also found small quantities of *invertin*,—a fermentlike body, possessing the property of inverting cane-sugar,—leucin, glucoso, very small quantities of glycerin, succinic acid, guanin, xanthin, sarkin, probably, also, inosit, and traces of alcohol.

Surface yeast (Oberhefe) differs in its composition from “bottom yeast.” It yielded nearly 12 per cent. of nitrogen, and contained about 75 per cent. of albuminates, and little more than 20 per cent. of cellulose with mucilage.—*Zeitschr. Oest. Ap. Ver.*, January 1st, 1879, p. 5; from *Ann. d. Chem.*

Beer-yeast—Composition.—P. Schutzenberger and A. Destrem consider yeast as containing complex compounds, at once hydrocarbonic and proteic, formed like glucosides, and easily decomposed by acids and alkalies. The exterior of these granules differs from the interior merely by containing more hydrocarbonic matter.—*Compt. Rend.*, February 24th, 1879; in *Chem. News*, March 21st, 1879, p. 123.

The same authors find that if yeast is placed in such conditions as to prevent its development and multiplication, it nevertheless preserves its power of decomposing sugar, and if it acts upon sugar it deassimilates more nitrogen than if preserved in presence of water without sugar and oxygen.—*Compt. Rend.*, March 17th, 1879; in *Chem. News*, April 10th, 1879.

Compressed Yeast.—This is prepared by causing the fermentation cells, after they have converted the saccharine matter in the mash into alcohol and carbonic acid, to rise to the surface, washing them thoroughly, and finally pressing. The yield of a good active product is accompanied by a slight loss of alcohol on dis-

tilling the mash, as the yeast ought to be removed before the alcoholic fermentation is completely finished. But this loss is insignificant compared with the value of the yeast. One kilogram of the latter costs less than five cents to the manufacturer. Any mixture of grain may be taken in its preparation.—New Rem., May, 1879, p. 158.

Ostrich Pepsin.—In a former report (Proceedings, 1876, p. 390) the preparation of an active pepsin, by powdering the dried ostrich stomach, has already been noted. Mr. Alfred Ebelot now again draws attention to this article (in "Revue des Deux Mondes"), and gives some account of its use by the Pampas Indians in the Argentine Republic.—Ph. J. Trans., April 5th, 1879, p. 820; from New Rem., March, 1879.

Referring to the above a correspondent of "Ph. J. Trans.," writes: "In the Argentine Republic ostrich pepsin is prescribed by medical men, and known by the public as 'pepsina nostra.' It is what you describe, the stomachs powdered. A good wine is made by digesting the stomachs with wine. 'Pepsina nostra' figures in Murray's 'Pharmacographia,' which serves as the national pharmacopœia in the Argentine Republic, in the absence of an official code."

The correspondent considers it a useful article, but being a rough preparation our pepsin is preferable.—Ibid, p. 840.

Peptone—Characters.—Mr. Stephen Darby communicates the following regarding the characters of peptone, which, on account of the attention it has lately received as a nutrient, may properly find a place here:

"Peptone, which belongs to the group of protein bodies, is specially distinguished from other members of this class by its ready solubility in water, and not undergoing coagulation when the solution is boiled; but it would, perhaps, be more conclusive to name, in addition to these, the diffusive property it possesses, for Schmidt has shown that albumen when freed from saline matters by dialysis no longer undergoes coagulation on heating. With one slight exception, all members of the protein group are convertible into peptone; this change may be effected in several ways, but by far the most ready one for obtaining peptone is digestion with acidified pepsin. Such conversion of protein bodies into peptone is possibly not direct, or, if it be so, other substances, intermediate in their properties, are formed with it, but these

pass, eventually, by sufficient digestion, into the condition of true peptone. It is so with the protein bodies which Meissner distinguishes as para-, meta-, and dia-peptone. On true peptone the acidified pepsin solution, or artificial gastric juice, exerts no further action, even with long-continued digestion, differing in this respect from pancreatic secretion, by which peptone is quickly split up, yielding other and crystalloid products. Peptone is freely soluble in water, and dissolves also in moderately strong alcohol. Its aqueous solution is not affected by boiling unless it be very prolonged. It dialyses readily, possessing a high diffusibility. Aqueous solution of peptone yields insoluble compounds with mercuric chloride (the precipitate being readily soluble in sodium chloride solution), and lead acetate with ammonia or basic lead acetate; but no precipitate is caused either by neutral metallic salts, acids, or alkalies; nor does ferrocyanide of potassium with acetic acid cause any turbidness. Alcohol in very considerable excess causes its precipitation, and this is more readily effected by admixture of ether with the alcohol. When a small quantity of cupric sulphate is added to a solution of peptone with caustic alkali, the brilliant rose-color produced is very noticeable as compared with the violet or purple tint yielded by a solution of unchanged proteid. The ultimate constituents of peptone, on analysis, seem to agree pretty nearly in their proportions with those of the protein substance from which it is obtained; there is, however, a somewhat diminished percentage of carbon and nitrogen, and a trifling increase in percentage of hydrogen. This has led to the conclusion that the difference is due to hydration of the original proteid, and similar to the change which takes place when grape-sugar is prepared from starch. This theory of hydration would appear to have received actual confirmation from the experiments of Dr. Henniger, who has resolved peptone into a species of syntonin by a process of dehydration. On heating a mixture of fibrin peptone and *acetic anhydride* he finds acetic acid is formed, together with a substance which dissolves in hot water, and, when the aqueous solution is reduced to only a slightly acid condition, by means of dialysis, yields a precipitate with either potash, nitric acid, or ferrocyanide of potassium, whilst the solution is also rendered turbid by heating."

Professor Bamberger, of Vienna, has employed peptone as a vehicle for mercurial subcutaneous injection, but its real value is

due to peculiar nutrient qualities. The value, as a means of nutrition, has, however, been strongly denied by some physiologists, who maintained that only the unaltered albumen was capable of being assimilated, and of replacing tissue waste; moreover, that peptone, being effete matter, incapable of becoming absorbed into the animal economy, was at once ejected in the form of secondary products. That such views are erroneous has been conclusively shown by many carefully conducted experiments, notably those published by Professor Maly, of Gratz, in 1875. It is true that for some years prior to this date peptone, or peptonized flesh, had been already extensively employed in England as an aliment, and no doubt existed in the minds of English physiologists and physicians as to the nutrient value of peptone; but the experiments of Maly (and others subsequently) prove incontestably that with food containing no other nitrogenized constituent than peptone, not only is health maintained, but an increased bodily weight is gained beyond that yielded with an equal amount of ordinary food, containing a similar proportion of unchanged proteid; whilst if peptone were effete and not available for nutrition, the animal must of necessity have steadily lost weight and died from starvation.—Ph. J. Trans., October 19th, 1878, p. 301.

Kreatin and Kreatinin—New Reaction.—J. Weyl has determined the following new reaction: When a very dilute, barely brown-red aqueous solution of nitroprusside of sodium is mixed with a very dilute solution of kreatinin, and solution of soda is then added drop by drop, a handsome ruby-red color is produced, which disappears after a time and gives place to an intense straw-yellow. The reaction is very delicate, and serves for the detection of kreatinin in urine, from which no substance has yet been isolated that produces the same reaction. Since kreatin is readily converted into kreatinin, this substance can also be determined when the two are not present together.—Ph. Centralh., April 3d, 1879, p. 139.

Diastase.—Baswitz finds that the action of diastase upon starch is promoted by the presence of carbonic acid.* The quantity of sugar formed in the presence of the latter is larger than when no carbonic acid is present. In both cases the maximum quantity

* Compare the articles of Bachet and Savalle on the conversion of starch into glucose by the direct action of carbonic acid; see Starch.

of sugar will be formed in from $2\frac{1}{2}$ to 4 hours. Pressure seems to retard the action in the presence of carbonic acid, as seems also the case if small quantities of lactic acid are present. He finds, furthermore, that during the formation of sugar in an atmosphere of carbonic acid the latter is absorbed with great avidity.—Ph. Centralh., January 9th, 1879, p. 12.

Diastase—Estimation.—There is no direct method by which diastase can be estimated, and there exist, according to W. R. Dunstan and A. F. Dimmock, only two indirect methods: the one depending on its action upon a known quantity of starch and subsequent estimation of maltose produced; the second dependent upon the same action, but substituting bread for starch. The authors have recently estimated the relative value, chiefly as regards diastase, of several kinds of malt extract, and have found the following process to answer well. It differs from the processes named in dealing with the direct action of diastase upon starch, independent of the products of that action. By means of this process the starch-converting power is determined with considerable accuracy. Two flasks of about a quarter liter capacity are selected, and into each from 0.1 to 0.3 gram of starch, previously dried at 180° to 212° F., is added. About 100 cc. of water are poured into each, and both are heated, with constant agitation, over a Bunsen burner, until the starch is all gelatinized. The flasks are then cooled down to 100° F., 10 grams of the malt extract or solution containing the diastase are diluted to 100 cc. by water, to one of the flasks a certain number of cc. of the diluted solution of malt extract or diastase are added, and to the other just twice that amount. The flasks are now allowed to remain for three hours at a temperature of 100° to 120° Fahrenheit. At the expiration of this time a drop of the solution, out of the flask to which the largest amount of diastase solution had been added, is placed on a white porcelain plate, and near it is placed a drop of a dilute solution of iodine in iodide of potassium. If, when the two drops are mixed, any color results, more of the solution of diastase must be added; but if no color is produced in the flask to which the larger amount of solution has been added, then the flask containing the smaller amount must be tested in the same way. If any color be produced, more diastase solution must be added until the exact point is reached when no color is produced, three hours being allowed between each addition of the diastase solution.

The authors give an example, from which it becomes apparent that the second flask, containing the smaller quantity of diastase solution, is simply for control. If the solution of starch, in the flask containing the larger quantity of diastase, continues to be blued by iodine, the diastase solution is added to that only, until the reaction is complete. The results are entirely empirical, and serve only as a comparison between one malt extract, taken as a standard, and another, the relative strength of which it is desired to determine. (See also Extract of Malt).—Ph. J. Trans., March 8th, 1879, p. 733.

Pancreatic Fluid—Composition.—According to Th. Defresne, the pancreatic liquid contains three distinct ferments, of which *myopsin* dissolves albumen, *amylopsin* saccharifies starch, and *steapsin* decomposes fats.

Myopsin is obtained from the pancreas of an omnivorous animal as follows: 100 grams of a filtered solution, containing 15 grams of dried pancreatic juice, are mixed with 40 grams of acetic acid (equivalent to 7.37 grams H_2SO_4); after 24 hours the mixture is filtered, and the filtrate mixed with alcohol. *Myopsin* forms garnet-colored shining scales, which are soluble in water, the solution being coagulated by heat; it digests 104 times its weight of albumen, but does not affect starch or fat.

The other ferments are best obtained from the pancreas of ruminants, for instance, the ox, which contain no *myopsin*.

Steapsin is obtained as follows: A concentrated filtered solution of beef pancreas is mixed with sufficient alcohol to make the mixture of an alcoholic strength of 26 volumetric per cent. The precipitate collected after 24 hours, and washed with 26 per cent. alcohol, constitutes *steapsin*, which, when dry, is in translucent shining scales, which are soluble in water. It has no action on starch, but decomposes 24 times its weight of fat. It is precipitated and rendered inactive by acetic acid.

Amylopsin.—To 100 grams of the liquid of beef pancreas 15.71 grams acetic acid (equal to 2.88 grams H_2SO_4) are added; the precipitate is separated, and before the expiration of two hours the clear liquid is precipitated by 200 grams of 85 per cent. alcohol. After washing and drying, *amylopsin* forms lemon-yellow shining scales, which saccharify 25 times their own weight of starch, are soluble in water, the solution being precipitated by alcohol and strong acetic acid, and coagulated by heat.

In a note to the above, the editor of "A. J. Ph." explains that the acetic acid required by the author has a strength of 23 per cent. $C_2H_4O_2$, specific gravity 1.0324.—A J. Ph., Aug. 1878, p. 386; from Rép. de Phar., June, 1878.

URINARY COMPOUNDS.

Urine—Determination of Indican.—The method ordinarily employed—admixture of 3 to 4 cc. fuming hydrochloric acid to 20 to 40 drops of the urine, addition of a few drops of nitric acid, and heating to boiling—is vitiated by the circumstance that the color reaction—red-violet to blue—often becomes indistinct from the formation of dark-colored compounds from other constituents of the urine. The method of Schunk, by which the indican is separated in a partially purified condition, gives good results, but is too troublesome. M. Weber obtains good results by the following modification of the usual method: In a test-tube, having a capacity of 80 cc., 30 cc. of urine and an equal volume of fuming hydrochloric acid are mixed, a few drops of dilute nitric acid are added, and the mixture is then heated, when it will become brown, and may, in the presence of larger quantities of indican, have a distinct red-violet tint. The mixture is now cooled by immersion in cold water, a layer of ether, about 2 to 3 cc., is poured upon the surface, a piece of paper is laid over the orifice, and, the thumb being applied, the mixture is well shaken. Upon the separation of the two layers a blue froth is observed, varying in quantity with the quantity of indican present, while the ethereal layer has a rose to carmine-red or violet color, and the aqueous layer a lighter and pure brown color. If the observation of the blue froth, which may require several minutes, is not distinct a few drops of alcohol are dropped upon the surface, upon which the froth disappears at once and gives place to a transparent blue and distinct film. The blue color is due to indigo blue, the red to indirubin.—Arch. f. Ph., October, 1878, p. 340.

Urine—Presence of Chloroform.—It has been alleged that chloroform can be detected in the urine as such after its administration, and Fehling's solution has been employed for its detection. E. Reichardt has recently investigated this subject, and he finds that, while chloroform has the power to reduce Fehling's solution, and accurate results are obtained even with the smallest quantity of chloroform if the Fehling's solution is sufficiently reduced, the reaction in urine does not properly belong to chloro-

form as such, but, as he thinks, to glucose, or, more frequently, to dextrin, both of which may be produced after the administration of chloroform. In several instances he subjected the urine of persons who had taken chloroform to distillation, and he should have obtained a reaction for chloroform in the distillate. In each case the results were in the negative as regards the distillate, while the original urine had the power to reduce Fehling's solution.—Arch. f. Ph., September, 1878, p. 252.

Urine—Chloroform as Reagent for Glucose.—Ach. Caillan recommends the following method for separating the sugar from urine: 2 parts of the urine are well shaken with 1 part of chloroform, and the turbid mixture is then allowed to stand until it has separated into two distinct layers. The upper layer is generally clear, nearly colorless, and contains all the sugar, which it yields in crystalline condition upon careful evaporation on the water-bath. The lower is thick liquid, sticky, and whitish. It is not mentioned whether the sugar obtained in this manner is free from other components of urine.—Ph. Centralh., March 13th, 1879, p. 117.

Urine—Detection of Mercury.—Dr. Paul Fürbringer has modified Ludwig's method for the determination of mercury in urine by substituting a commercial substance, which he calls "brass-wool" (Messingwolle), and which has the appearance of a confused mass of finely cut tinsel, for the zinc-dust directed for the precipitation of the mercury from its solution. Dr. Vulpius, in view of the evident value of Fürbringer's modification, has taken some trouble to determine the exact nature of the "brass-wool" named, and has learned, upon inquiry, that the composition is made in Augsburg, and is brought into its commercial form at Nuremberg, Bavaria, where it is sold under the name of "cement plätt" for the decoration of Christmas trees. Dr. Vulpius has subjected the substance to analysis and finds it to be composed of 99.5 per cent. of copper, containing a little iron as impurity, and 0.5 per cent. of zinc, the latter being, however, simply on the surface of the small metal leaflets. If these are immersed in acidulated urine any mercury present is deposited upon them after a few minutes in a metallic state and free from all other admixture. The substance is then removed, washed with water, absolute alcohol, and ether, whereby it becomes completely clean and dry. It is now formed into a pellet, which is introduced into a combustion-tube drawn to capillary diameter at one end, after

which the other end is also drawn to capillary diameter. The centre of the tube, occupied by the pellet, is now heated to near redness in an ordinary flame, which causes the mercury to vaporize and to form ringlike deposits in both capillaries. A few fragments of iodine are then introduced into the central thick portion of the tube through one of the capillary ends, and the iodine being vaporized by slight heating will at once convert the rings of metallic mercury into biniodide, plainly visible with $\frac{1}{4}$ th and even $\frac{1}{8}$ th milligram of mercury from 300 cc. of urine. The method of Ludwig, besides being more troublesome in its details, suffers from the fact that the zinc-dust carries down with it certain impurities which are difficult to remove, and when heated subsequently interfere with the delicacy of the reaction. Moreover, the delicacy of the reaction is impaired by deposits of oxide of zinc that are liable to form in the capillary, and the process requires special apparatus, all of which is avoided by Fürbringer's modification.—Arch. f. Ph. April, 1879, p. 344.

Hippuric Acid—Preparation and Determination.—Cazeneuve draws attention to the difficulties attending the present method of isolating and determining the presence of hippuric acid. To obtain the acid from the urine of herbivorous animals it is recommended to add sulphate of zinc, concentrate the liquid, filtering, crystallizing the hippurate of zinc, and decomposing with hydrochloric acid; the crude acid being then obtained in tolerable condition of purity by treatment with animal charcoal and repeated crystallization. For its determination in human urine, Liebig and Thudichum recommend the evaporation of the urine, decomposition of the residue by hydrochloric acid, agitation with ether, evaporation of the ethereal solution, and washing of the residual hippuric acid with water. This method is faulty because the ether does not readily dissolve the acid, and a portion is subsequently dissolved by the water. Cazeneuve therefore recommends the following simple method, which is applicable both to the preparation of hippuric acid from cattle urine and its determination in human urine: 1 liter of urine, 200 grams gypsum, and 20 grams alum are evaporated together to dryness on a water-bath. By the action of the alum the carbonates present in the urine are decomposed, carbonic acid is given off abundantly, and the hippuric acid is liberated from its combinations. The residue is triturated, and then exhausted with warm ether, which leaves the hippuric acid on evaporation almost perfectly white and pure.—Zeitschr. Est. Ap. Ver., January 1st, 1879, p. 2.

REPORTS OF COMMITTEES.

REPORT OF THE COMMITTEE ON THE DRUG MARKET, FOR THE FISCAL YEAR ENDING JUNE 30TH, 1879.

BY WILLIAM HULL WICKHAM, OF NEW YORK, CHAIRMAN.

THE drug trade during the year ending June 30th, 1879, showed an increase in comparison with the previous twelve months, and the results of business were generally more satisfactory to both jobbers and retailers, especially during the last half. This improvement may be traced to the better tone of confidence inspired by the financial situation, and the general impression that values had reached the lowest ebb. This year was marked by the disappearance of the gold premium, gold dropping to par January, 1879.

A general expectation of an unusual fall demand is now felt in all branches of trade, in consequence of the exceedingly large estimates of crops in almost every section of our country.

The number of failures in the trade was less than usual, and their importance was inconsiderable. Many concerns who were last year financially crippled and embarrassed, were enabled by the better state of affairs to recover.

Prices during the last four months of our fiscal year exhibited a hardening tendency, and the advances affecting a number of articles have been since maintained.

There was no tariff agitation except in the spring of 1879, when the question arose of placing quinine and the salts of quinine on the free list. This result was unexpectedly accomplished by the rapid passage of the so-called McKenzie Quinine Bill through both houses of Congress and the signature of the President, on July 1st, 1879.

The drug exports were somewhat larger than during the pre-

vious year, trade with Central and South America and Australia being on the increase, but by far the largest proportion of the drugs, medicines, and chemicals consumed in these countries are still furnished by Europe. The new tariff laws of Canada have lessened our transactions in many articles with our neighbors, but the impression seems to be gaining ground that a return to the former tariff is not unlikely, as much dissatisfaction with the present one is expressed.

The following table of total exports and imports of *all* merchandise was copied from the "New York Tribune," of July 28th, 1879, and may be of interest, as the facts account for a great deal of our present prosperity.

General Nimmo has collated with the report for the year just passed a few figures which show the rapidity with which American commerce has grown since the close of the late war for the preservation of the Union. The figures for the leading years for merchandise only are as follow :

Year ending June 30th.	Total exports.	Total imports.	Excess of exports.	Excess of imports.
1865,	\$166,029,308	\$238,745,550		\$72,716,277
1870,	292,771,768	485,958,408		143,186,640
1875,	513,442,721	533,005,436		19,562,725
1878,	694,865,766	437,051,532	\$257,814,234	
1879,	710,428,743	445,792,141	264,636,602	

Since 1865, inclusive, there has been an excess of exports over imports of merchandise amounting to \$126,000,000. That is the balance of trade for the whole period of fifteen years.

The value to the members of the American Pharmaceutical Association of a yearly report on the drug market, printed so long after the dates at which the prices noted were current, seems to consist principally in the information to be derived concerning the fluctuations of the staple drugs at different periods of the year, so that by comparison of the reports of several years deductions can be made, not accurate enough to establish definite laws, as conditions vary, but sufficiently indicative to suggest the seasons in which certain drugs might be advantageously purchased. Advantage may also be derived from the perusal of data furnished concerning newly discovered remedies, or such as being known before have been brought into more recent notice; and from information regarding new sources of supply for drugs and chemicals.

For the purpose of simplifying reference your chairman has compiled a table of the ruling prices in New York for each month of our fiscal year of some of the principal staples.

In answer to correspondence with the other members of the committee the writer has heard from Mr. J. G. Steele, of San Francisco, who promises to present, at Indianapolis, a report on his market, which will undoubtedly be very interesting and instructive. Mr. T. Roberts Baker has also agreed to forward a paper.

Yours, very respectfully,

W. H. WICKHAM.

OPIUM.

The prices of this important article for the year ending June 30th, 1879, were quite uniform, the fluctuations not being wide, nor were the "spurts" of long duration. The outturn of the crop of 1878 was 5000 cases, which, with large stocks in various hands, prevented any decided advance. During the close of the year great efforts were made by the large holders to stimulate an increase in price by the circulation of reports of damage to the approaching crop, but with only slight success, buyers assuming that, even on a basis of 4000 cases for the new crop, there would be sufficient left over from previous years to cover the wants of two years' consumption.

In this report Smyrna opium is always referred to, and the prices are duty paid (duty being one dollar per pound).

July, 1878.—Market opened at \$4.25, duty paid, but became firmer on receipt of reports that the estimates of the crop had been reduced from 7000 to 5000 cases, and closed at \$4.50. Smyrna market was steady at 125 piastres, with increasing demand and few sellers.

August, 1878.—The first week exhibited an interesting position of the market; the large dealers were offering to buy all that offered at \$4.50, but sellers preferred to wait for further developments. The estimates of 5000 cases being confirmed, a decided advance was expected as soon as demand set in and sales were made at \$4.62½; \$4.75 and \$5.00 being asked. About the middle of the month very few sales were effected, and the price, in spite of the confidence of most holders, weakened to \$4.70. At close of the month more opium arrived, and a sale was made at \$4.50, although \$4.60 was generally quoted.

September, 1878.—The month was not marked with much excitement, prices opening at \$4.50 and closing at about the same figure. The arrivals were considerable. Small purchases in Smyrna of the Dutch Government did not affect values.

October, 1878.—The market opened under better auspices at \$4.60. Cablegrams from Smyrna reported an active market and firmness at 128 piastres, but notwithstanding these reports prices declined to \$4.37½, and before the close of the month touched \$4.25, duty paid, the lowest quotation for the year, and an extremely low figure for opium.

November, 1878.—The market opened more actively at \$4.30; about the middle of the month large transactions were reported, both here and in Smyrna, equivalent to \$3.45 in bond, and single case lots brought \$4.50, duty paid. The month closed quiet, but firm, at \$4.60, with upward tendency.

December, 1878.—Cables from Smyrna to the effect that the drought had affected the usual fall sowings produced considerable buoyancy, and \$4.62½ was offered with no takers.

A few sales were made at \$4.65, and later \$4.75 was asked.

Reports of rain in the opium districts were received, and holders of speculative lots evinced a desire to realize; \$4.75 continued to be the asking price until it became evident that to secure buyers this price must be shaded, when \$4.67 and even \$4.62½ were accepted for a few lots.

January, 1879.—The market opened weak. Recent arrivals and a decreased demand influenced the views of holders, while the effects of the large stock of old opium together with an average sowing for the new crop, despite the various rumors circulated "that the sowings had suffered from the drought," and again "that too much rain had spoiled the sowings," were discouraging to buyers, and prices dropped to \$4.37½, without much inquiry.

February, 1879.—During the first two weeks of February opium was quiet and dull at \$4.37½. A disposition at Smyrna to hold for higher figures strengthened our market, and small lots changed hands at \$4.45; buyers, however, could not be induced to indulge, and the market closed quiet.

March, 1879.—A firmer feeling was evidenced by the sale of several cases at \$4.45, duty paid, and this condition of steadiness continued until the latter part of the month, when \$4.45 could be shaded, although this was the nominal price.

Large sales reported in Smyrna had no effect on quotations here.

April, 1879.—Opium was quiet and dull at \$4.45, and continued so until the end of the month, when a slight advance was effected, and April closed steady with quotations at \$4.50 and \$4.55.

May, 1879.—A firmer feeling prevailed at the opening of the month.

Further reports about the drought were received, and several sales were made at \$4.55 and \$4.62½.

Later, more activity was experienced, and \$4.75 was asked and obtained for a few cases.

Speculation as to the yield of the coming crop was rife, as everything would hinge upon its size. With little demand at the close of the month quotations were nominal at \$4.62½.

June, 1879.—No increased demand appeared with the advent of June; conflicting reports concerning the new crop were daily received; quotations dropped to \$4.55, but a reaction taking place, a few sales at \$4.60 were made, and the market closed moderately firm. The estimates of the crop at present writing (August 15th) are still conflicting, ranging between 3500 and 4000 cases.

MORPHINE.

Manufacturers declined their price in July, 1878, to \$3.50, and the demand during July and August was fair, but quiet during September, October, and November. In December morphine sympathized with the improvement in opium, and manufacturers advanced their price to \$3.75, which figures ruled during January. In February the manufacturers dropped to \$3.65, which price continued through March and April. In May the demand increased, and considerable contracting was accomplished at \$3.65; towards the end of the month manufacturers advanced to \$3.80, which price ruled through June, with fair demand. The same remark may be made regarding morphine this past year as was applicable to the previous year:

“The figures which ruled for morphine during the past year have been largely in excess of the relative value of the article in comparison with opium.”

QUININE.

July, 1878, found American quinine steady at \$3.50 from manufacturers' hands, while foreign could be laid down at lower figures. The demand set in early in August, increasing so rapidly during

the second week that the largest manufacturers, declaring they were short of stock, refused to take new orders except for small quantities, which action created much excitement, and considerable lots were purchased from second hands, until prices were forced up to \$4.75; sales of French to arrive were made, ranging from \$3.10 to \$3.75.

Prices abroad were much higher, 12 shillings and 6 pence being quoted, and stocks were reported as being small. Manufacturers advanced their price to \$3.80, without offer, but the excitement gradually subsided, and at the close of August \$4 00 would buy. September opened easier, as the scarcity was relieved by arrivals of foreign, and by the American manufacturers delivering more freely; at the close of the month the demand fell off, and \$3.80 could be shaded for outside lots. In October manufacturers reduced their price to \$3.60, a fair demand existing. Prices remained unchanged during November, December, and January, with light demand. In February price was reduced by the American chemists to \$3.40, with good demand. The market abroad was very firm, The effort of the manufacturers to depress the price of bark by reducing the price of quinine was unsuccessful; bark being still held at high figures, and stocks being very light.

March opened with active demand, and during the second week manufacturers advanced their prices to \$3.60 without offers; foreign also continuing to advance. Sales were made at \$3.75 and \$4.00, which were the ruling prices during the first half of April, but later stocks commenced to accumulate and outside holders offered to sell at \$3.65 and \$3.70, and manufacturers began to deliver to regular customers at \$3.60.

During May quinine was procurable from the chemists at \$3.60 as wanted. On account of reduced demand, about the first of June, manufacturers lowered their price to \$3.40; buyers were very irresolute, as it was uncertain whether Congress would take any action in regard to repealing the 20 per cent. duty, and on the last day of June, when it was generally supposed that no legislative action would be taken relative to quinine until the winter session, the McKenzie Bill was sprung upon the House and was quickly passed by a large majority; the Senate's prompt action and the President's signature the following day made the bill a law.

Quinine in Europe had been stiffening for some weeks pre-

viously, and upon instructions of the action of the House on Monday night (June 30th) large orders were cabled to the other side which so much exceeded the immediate capacity of manufacturers to execute the same that they rapidly advanced prices, so that the cost of importation on the free basis equalled the previous price, duty paid. During the first days of July, 1879, great excitement was noticeable; the principal houses manufacturing quinine announcing that they would be obliged to discontinue its manufacture, confining themselves to the completion of contracts already made, and advanced their price to \$3.50 without offer.

Foreign quinine in bond at the time of the repeal of the duty was ordered to be exported and reimported before it could be withdrawn free from bond.

The probable effect of this measure will be that the American manufacturers will continue to make quinine and the other cinchona alkaloids, with the former more of the side product instead of the latter. We shall have various brands of foreign manufacture in market, and there will be a necessity for more attention being paid to testing quinine; the ether test is generally satisfactory, being quickly learned and easily applied.

It is to be regretted that the 10 per cent. duty on the rich East India barks prohibits American manufacturers from using them advantageously and confines them to the working of South American barks.

CINCHONIDIA SULPHATE.

During July, August, and September the manufacturers' price was steady at 65 cents I. V., with increasing demand. The latter part of September found manufacturers sold up, and outside holders asking 80 and 85 cents. In October the surplus stocks were exhausted, and the price was advanced to 80 cents I. V., but even at this advanced figure manufacturers were unable to execute their orders, the market became bare, and outside lots brought \$1.00. In November the market ruled at 85 cents with good demand, and during December and January cinchonidia was in fair request at 80 cents from manufacturers' hands. In February manufacturers advanced their price to \$1.00, and large purchases were made during this month, some outside lots changing hands above this figure. Very large contracts were made for cinchonidia with European chemists during the winter, which tested their capacity to the utmost.

March opened with great activity; manufacturers advanced to \$1.15 without offer, and outside lots found purchasers at \$1.25; later the chemists again advanced 10 cents an ounce (\$1.25), and the month closed with great excitement at \$1.35, the general quotation.

An attempt was made during the spring to relieve the demand for cinchonidia by advertising and pushing cinchonia alkaloid and mixture. During April cinchonidia settled down to \$1.20 in bulk and \$1.25 in ounces from manufacturers' hands with fair demand.

The demand for May was good and the market firm at \$1.25. There was a large inquiry for cinchonidia in June, prices advanced abroad, and at the close of the month all the foreign at prices under \$1.15 was bought up; one lot of 10,000 ounces changing hands.

The McKenzie Quinine Bill does not affect cinchonia, nor cinchonidia, and prices are not likely to be any lower during 1879.

The sales of cinchonidia are estimated to have been three times the amount of the previous year.

Citric acid fluctuated during the year from 63 cents in August down to 53 cents in April, closing in June at 54 cents. The English manufacturers have about given up competing with the American because of the duty of 10 cents a pound.

Oralic acid touched lower figures than the previous year, ruling at 8½ cents during March, April, May, and June.

Tartaric acid crystals was advanced by the scarcity of argols to 46½ cents in September, declined in January to 44 cents, and continued at the same price through June. There was no English imported.

Carbonate of ammonia ruled very steadily during the year excepting in November and December, when an active demand on a bare market caused an advance to 19 cents and 18 cents respectively. English and American compete in price.

Balsam copaiba came in more freely towards the end of September, and sold down to 28 cents, but continued to advance until February, when it settled again to 30 cents, but recovered in March, and closed in June at 35 cents; the highest figure touched during the twelve months. Receipts were by no means as large as last year, but stocks were in too many hands to admit of concentration and a heavy advance.

Balsam Peru was quite uniform in price until March, when the stocks became reduced, and \$1.15 was obtained. In April it was bought up and controlled, the principal holder asking \$1.25. In May \$1.50 was asked, and lots could not have been bought to arrive under \$1.25. In June the highest figures were reached. On account of advance abroad and concentration of stocks here large sales were made at \$1.35, \$1.50, \$1.60 and \$1.75, holders at the end of the month demanding \$2.00, which price can, probably, not be maintained.

Balsam Tolu ranged from 90 cents in July down to 50 cents in April and May, recovering to 60 cents in June. The arrivals of Balsam Tolu during the spring months were very large, and the reaction in price in June was only brought about by the shipment of several lots to Europe, relieving the market.

Tonca beans were in light supply, and prices were well sustained. In May and June the arrival of the new crop weakened prices, but the outturn of the crop was found to be less than was expected, and sales were readily made at \$1.25 and \$1.35; jobbing at \$1.50 at the end of June.

Vanilla Beans.—It is difficult to quote prices, as so much depends upon the quality. Prices in the table refer to prime qualities only. Inferior grades were procurable at from \$5.00 to \$9.00. Prime grades were scarce, and high figures were noticeable. In May the first arrivals of the new crop appeared, but the quality was very poor. Shipments in June were no better, and an advance of $33\frac{1}{3}$ per cent. took place, the month closing with quotations of \$18.00 for a specially fine bean.

Blue vitriol steadily declined from July, 1878, to May, 1879, being firmer in June, when large transactions took place. In May inferior grades were sold at $4\frac{1}{2}$ cents, but the Paris green manufacturers bought up all the cheap lots, and the market stiffened to $5\frac{1}{2}$ cents. The extremely low prices of blue vitriol were due to the low price of copper and the new sources of supply in refining the precious metals.

Borax was advanced in August to 8 and $8\frac{1}{2}$ cents on account of the limitation of the production from the Nevada mines, and continued firm with upward tendency during the year.

Cantharides.—*Russian* ruled very uniform during the year. The same reasons as existed last year kept prices down. *Chinese* have been sold from 65 cents down to 40 cents.

Cassia and Cloves.—Variations in prices may be seen by referring to the table.

Cream of Tartar Crystals.—On account of advance in argols abroad, and bareness of market here, prices advanced in July to 27 and 27½ cents, and complaints were made that manufacturers were delivering casks containing 900 pounds instead of 1100 pounds, the usual weight. Argols continued scarce, and cream of tartar steadily advanced till December, manufacturers being frequently obliged to purchase their own cream in the market to fill their contracts. During the spring months larger supplies and strong competition depressed prices, but in the latter part of May, and during June, a sharp recovery took place; manufacturers again had difficulty to fill their contracts, and there was no surplus in second hands. The market closed in June firm at 27½ cents. The variations in prices during the year may be observed by referring to the table. The American cream of tartar has entirely superseded the French, the duty being virtually prohibitory.

Ergot has ruled very low, although June closed with a stronger market.

Arnica and chamomile flowers have fluctuated considerably (see table), and the prospects are that higher prices will rule for the new crops.

The following are abstracts from correspondence from Germany, relating to the harvest of botanic drugs: "These articles will in general be very scarce in Europe this year, at least in Germany and Austria, where the harvest is especially a very bad one. First, the long winter we had, and then such a continual dryness in the present spring on this side of the Elbe as seldom happens; whilst on the other side of this river, particularly in the south and in whole Hungary, frequent rains, spreading during the past four or five weeks also over the other parts of Germany and Austria, damaged the harvest. By this weather not only the vegetation suffers, but also the drying of the plants causes so much trouble to the gatherers that they prefer to give up this work. This regards, for the most part, *chamomile flowers*, which only grow wild, and are gathered by the poor people. During the fifteen years that I have now occupied myself with the trade of botanic drugs as a specialty, we never had such a bad harvest of chamomiles before. Moreover, the stock of old

chamomiles in Germany and Austria has decreased considerably, owing to the low prices of last year, which favored but little the gathering, and we shall, therefore, be soon cleared out if a quick demand for export will take place."

"*Arnica Flowers*.—We shall hardly have half the harvest of 1878." . . .

Gum Camphor.—July, 1878, demand was light, and competition strong, which forced prices down to 23½ cents. In September there was an improved demand; most outside lots were bought up, and the month closed with the market at 26 cents, some holders asking 28 cents. The demand was again active in December, and 27½ cents was touched. March furnished the usual demand, which was increased in April, and prices were firm at 27½ cents, until the arrivals of considerable crude at close of the month induced one refiner to offer at 25½ cents. Sales were very free at 25½ cents in May, on account of the warm weather inciting a large demand, and toward the end of the month the difficulty of the refiners to keep pace with the demand produced speculation; the price was rapidly advanced to 32 cents, afterwards dropping to 30 cents; at the same time future delivery could have been obtained for 25 cents. Camphor sold at 27 cents during first week in June, but gradually declined, as supplies exceeded demand, to 25 cents.

Essential oils generally improved in demand and price toward the close of our year.

Castor oil ruled steady till November, when an advance in the price of Western beans caused heavy transactions to be made in oil, and manufacturers asked 13 to 13½ cents. The combination continued strong and unwavering, and prices rose to 14 and 14½ in December, 15 and 15½ in January, 16 and 16½ in April, and 17 and 17½ in June. Almost the entire crop of beans was contracted for by the manufacturers before the advance, and the profits accrued to them and not to the growers.

Throughout the year English castor oil was purchasable in bond at from 9 to 11 cents.

Beans are free, and the duty on oil is \$1.00 per gallon.

To write specially concerning each article on the list would cumber up an already lengthy and dry report, and the following table is intended to give an approximation of the ruling prices at the close of each month, generally for largest lots from importers or first hands.

The compiler trusts the same will be of some interest.

	July, 1878.	August.	Sept.	October.	Nov.	Dec.
Acid, citric,	61	63	63	63	63	62
Acid, oxalic,	83 $\frac{3}{4}$	83 $\frac{3}{4}$	9	9 $\frac{1}{2}$	9 $\frac{1}{2}$	9 $\frac{1}{2}$
Acid, tartaric, crys.,	44 $\frac{1}{2}$	46	46 $\frac{1}{2}$	46 $\frac{1}{2}$	46 $\frac{1}{2}$	46 $\frac{1}{2}$
Ammonium, carb.,	17	17	17 $\frac{1}{2}$	17 $\frac{1}{2}$	19	18
Bals. copaiba,	82	80	28	29	80	34
Bals. Peru,	1.05	1.02 $\frac{1}{2}$	1.10	1.05	1.05	1.05
Bals. Tolu,	90	80	80	70	70	65
Beans, tonca,	1.65	1.65	1.70	1.75	1.65	1.65
Beans, vanilla, prime,	\$10 to \$14	\$10 to \$14	\$10 to \$14	\$9 to \$13	\$10 to \$14	\$10 to \$14
Blue vitriol,	7 to 7 $\frac{1}{4}$	7 to 7 $\frac{1}{4}$	6 $\frac{1}{2}$ to 6 $\frac{3}{4}$	6 $\frac{1}{4}$ to 6 $\frac{1}{2}$	6 $\frac{1}{4}$ to 6 $\frac{1}{2}$	6 $\frac{1}{4}$ to 6 $\frac{1}{2}$
Borax,	7 to 7 $\frac{3}{4}$	8 to 8 $\frac{1}{2}$	8 to 8 $\frac{1}{2}$	8 $\frac{1}{2}$ to 9	8 $\frac{1}{2}$ to 9	8 to 8 $\frac{1}{2}$
Cantharides, Rus.,	1.00	1.00	1.05	1.05	1.00	1.00
Cassia bark, ma's,	19	19	19 $\frac{1}{2}$	19 $\frac{1}{2}$	20	20
Cinchonidia, sulph.,	65	65	65	90	85	80
Cloves,	35	35	36	36	37	36
Cream of tartar, crys.,	27 to 27 $\frac{1}{2}$	28, 28 $\frac{1}{2}$	28 $\frac{1}{2}$, 29	30, 30 $\frac{1}{2}$	30 $\frac{1}{2}$, 31	28, 28 $\frac{1}{2}$
Ergot. prime,	25	25	25	25	24	24
Flowers, arnica,	12	13	13 $\frac{1}{2}$	15	14 $\frac{1}{2}$	12 $\frac{1}{2}$
Flowers, chamomile, Belg., . .	25	25	25	23	22	22
Flowers, chamomile, Germ., . .	16	16	20	18	18	18
Glycerin, conc., cans,	16 to 18	16 to 18	15 $\frac{1}{2}$ to 17	15 $\frac{1}{2}$ to 17	15 $\frac{1}{2}$ to 17	15 $\frac{1}{2}$ to 17
Gum aloes, Cape,	12	12	12	12	12	11 $\frac{1}{2}$
Gum camphor,	23 $\frac{1}{2}$	23 $\frac{3}{4}$	26	26	25 $\frac{1}{2}$	27 $\frac{1}{2}$
Gum catechu (Cutch),	5	5	5 $\frac{1}{4}$	5 $\frac{3}{4}$	6	6
Gum catechu (Gambier),	4	3 $\frac{7}{8}$	4	4 $\frac{1}{4}$	4 $\frac{1}{4}$	4 $\frac{1}{8}$
Gum fetida,	13 to 16	13 to 16	13 to 16	13 to 16	15 to 18	15 to 18
Gum opium, opening,	4.25	4.50	4.50	4.60	4.30	4.62 $\frac{1}{2}$
Gum opium, closing,	4.50	4.60	4.50	4.25	4.60	4.67
Gum shellac, "D. C.,"	23	24	24	24	22	24
Iodine,	5.00	5.00	4.90	5.00	5.00	5.25
Manna, S. F.,	35	35	35	32	32	32
Manna, L. F.,	70	70	70	70	70	70
Mercury,	48	47	48	47	47	45
Mercury, corros. sub.,	50	52	55	55	52	53
Mercury, calomel,	60	62	65	65	62	68
Mercury, red precip.,	70	72	75	75	72	78
Mercury, white precip.,	80	82	85	85	82	88
Morphia, $\frac{1}{8}$ s,	3.50	3.50	3.50	3.50	3.50	3.75
Oil, anise,	1.85	2.00	2.10	2.25	2.50	3.00
Oil, bergamot, opt.,	2.70	2.80	2.75	2.75	2.65	2.60
Oil, cassia, opt.,	73	73	75	70	70	70
Oil, castor,	11 $\frac{1}{2}$ to 12	11 $\frac{1}{2}$ to 12	11 $\frac{1}{2}$, 12	11 $\frac{1}{2}$, 12	13, 13 $\frac{1}{2}$	14, 14 $\frac{1}{2}$
Oil, citronella, "N.,"	70	70	70	70	75	80
Oil, citronella, "W.,"	80	80	80	85	85	90
Oil, clove,	2.30	2.80	2.40	2.40	2.45	2.45
Oil, lemon, opt.,	2.50	2.40	2.50	2.40	2.40	2.35
Oil, peppermint, opt.,	1.75	1.75	1.60	1.60	1.60	1.65
Oil, rose, Kis.,	10.00	9.00	9.00	7.50	7.50	7.50
Oil, sassafras,	35	33	36	50	45	45
Oil, wintergreen,	1.85	1.75	1.80	2.00	2.10	2.10
Potas., bichromate,	13	14	13 $\frac{5}{8}$	13 $\frac{5}{8}$	13 $\frac{5}{8}$	13 $\frac{5}{8}$
Potas., bromide, bulk,	40	40	38	37	35	35
Potas., chlorate, Eng.,	18	17 $\frac{3}{4}$	17 $\frac{3}{4}$	17 $\frac{3}{4}$	17 $\frac{1}{2}$	17 $\frac{1}{2}$
Potas., iodide,	3.65	3.60	3.53	3.75	3.75	4.00
Potas., prussiate,	22	22	22	22	22	22
Powder, insect,	40	40	40	40	35	45
Quinine, sulphate,	3.50	3.50	3.80	3.60	3.60	3.60
Root, ipecac.,	1.25	1.12 $\frac{1}{2}$	1.10	1.25	1.05	1.05
Root, jalap,	20	20	20	20	20	24
Root, squill,	8 $\frac{1}{2}$	8 $\frac{1}{2}$	8	8	8	8
Seed, canary, Smyrna,	1.70	1.65	1.85	1.85	1.70	1.70
Seed, canary, Sicily,	2.25	2.25	2.30	2.30	2.20	2.20
Seed, cardamom,	1.75 to 2.50	1.75 to 2.50	2.00 to 2.50	1.75 to 2.25	1.75 to 2.25	2.10 to 2.60
Seed, hemp,	1.50	1.40	1.35	1.35	1.35	1.45
Soap, castile, mot.,	7 $\frac{3}{8}$	7 $\frac{3}{8}$	7 $\frac{3}{8}$	7 $\frac{3}{8}$	7 $\frac{1}{2}$	7 $\frac{3}{8}$
Soap, castile, white,	15	15	15 $\frac{1}{4}$	17	15	15
Soda, bicarb., Eng.,	3 $\frac{5}{8}$	3 $\frac{7}{10}$	3 $\frac{7}{10}$	3 $\frac{3}{4}$	3 $\frac{7}{10}$	3 $\frac{7}{10}$
Soda, bicarb., Amer.,	3 $\frac{1}{4}$	3 $\frac{1}{4}$	3 $\frac{1}{4}$	3 $\frac{1}{4}$	3 $\frac{1}{4}$	3 $\frac{1}{4}$
Sugar of lead, white,	18 $\frac{1}{2}$	19	19	19	19	19

January, 1879.	February.	March.	April.	May.	June.
59	58	58	53	54	54
9 $\frac{1}{2}$	9	8 $\frac{1}{2}$	8 $\frac{1}{2}$	8 $\frac{1}{2}$	8 $\frac{1}{2}$
44	44	44	44	44	44
17 $\frac{1}{2}$	17	17	17	17	17
31	30	34	33	32	35
1.05	1.05	1.15	1.25	1.30	2.00
65	60	55	50	50	60
1.65	1.65	1.60	1.60	1.50	1.35
\$10 to \$14	\$14 to \$18	\$14 to \$18	\$10 to \$14	\$9 to \$12	\$13 to \$17
6 $\frac{1}{4}$ to 6 $\frac{1}{2}$	5 $\frac{3}{4}$ to 6	5 $\frac{3}{4}$ to 6	5 $\frac{1}{4}$ to 5 $\frac{1}{2}$	5 to 5 $\frac{1}{4}$	5 $\frac{1}{2}$ to 6
9 to 9 $\frac{1}{2}$	9 to 9 $\frac{1}{2}$	9 $\frac{1}{2}$ to 9 $\frac{3}{4}$	9 $\frac{1}{2}$ to 9 $\frac{3}{4}$	9 $\frac{1}{4}$ to 9 $\frac{1}{2}$	9 $\frac{1}{4}$ to 9 $\frac{1}{2}$
1.00	1.00	1.00	1.00	1.00	1.00
20	20	20	18 $\frac{1}{2}$	18	17 $\frac{1}{2}$
80	1.00	1.35	1.25	1.25	1.25
40	41	41	41	41	40
23, 23 $\frac{1}{2}$	23 $\frac{1}{2}$, 24	23 $\frac{1}{4}$, 23 $\frac{3}{4}$	24, 24 $\frac{1}{2}$	24 $\frac{1}{2}$, 24 $\frac{3}{4}$	27, 27 $\frac{1}{2}$
24	24	26	30	24	30
12	13	14	14 $\frac{1}{2}$	14	14
18	18	16	20	18	18
18	18	17	19	19	25
15 $\frac{1}{2}$ to 17	15 $\frac{1}{2}$ to 17	15 $\frac{1}{2}$ to 17	15 $\frac{1}{2}$ to 17	15 $\frac{1}{2}$ to 17	15 $\frac{1}{2}$ to 16
11 $\frac{1}{4}$	11	11	11	12	13
27 to 27 $\frac{1}{2}$	28	27 $\frac{1}{2}$	25 $\frac{1}{2}$	30	25
6	5 $\frac{3}{4}$	6	5 $\frac{1}{2}$	5 $\frac{1}{2}$	6 $\frac{1}{2}$
4	4	4	3 $\frac{3}{4}$	3 $\frac{3}{4}$	3 $\frac{3}{4}$
15 to 18	15 to 18	15 to 18	15 to 18	15 to 18	17 to 20
4.50	4.37 $\frac{1}{2}$	4.45	4.45	4.55	4.55
4.37 $\frac{1}{2}$	4.45	4.45	4.55	4.62 $\frac{1}{2}$	4.60
24	24	24	23	22	21
5.25	5.25	5.15	5.50	5.50	5.50
32	34	34	36	40	40
70	90	90	90	90	90
43	42	41	40	40	39
58	57	55	55	55	55
68	67	65	65	65	65
78	77	75	75	75	75
88	87	85	85	85	85
3.75	3.65	3.65	3.65	3.80	3.80
2.75	2.35	2.12 $\frac{1}{2}$	2.00	2.00	2.25
2.50	2.40	2.40	2.35	2.30	2.40
75	72	75	80	80	85
15, 15 $\frac{1}{2}$	15, 15 $\frac{1}{2}$	15 $\frac{1}{2}$, 16	16, 16 $\frac{1}{2}$	16, 16 $\frac{1}{2}$	17, 17 $\frac{1}{2}$
80	85	85	85	90	1.00
90	95	95	93	1.00	1.25
2.70	2.60	2.60	2.55	2.50	2.45
2.60	2.60	2.50	2.45	2.50	2.60
1.55	1.50	1.50	1.45	1.60	2.00
7.25	7.25	7.00	7.00	7.00	7.00
43	44	42	37 $\frac{1}{2}$	36	35
2.00	2.00	2.00	1.75	1.75	2.20
13 $\frac{5}{8}$	13 $\frac{1}{2}$	13 $\frac{1}{2}$	12	11 $\frac{3}{4}$	11 $\frac{1}{2}$
35	34	32	32	31	31
16 $\frac{1}{2}$	16	16	15 $\frac{3}{4}$	15 $\frac{3}{4}$	15 $\frac{3}{4}$
4.00	4.00	3.90	4.20	4.20	4.25
22	22	21	21	21	22
55	70	75	70	70	65
3.60	3.40	4.00	3.65	3.60	3.40
1.05	1.20	1.20	1.15	1.07	1.05
24	24	24	21 $\frac{1}{2}$	23	22
8	8	14	15	15	20
1.60	1.55	1.55	1.55	1.55	1.70
2.20	2.10	2.10	2.10	2.10	2.10
2.10 to 2.60	2.10 to 2.60	2.10 to 3.00	2.40 to 2.75	2.40 to 2.75	2.40 to 2.75
1.40	1.40	1.40	1.40	1.35	1.35
7 $\frac{1}{2}$	7 $\frac{1}{2}$	7 $\frac{1}{4}$	7	7 $\frac{1}{4}$	7 $\frac{1}{4}$
14 $\frac{1}{4}$	13 $\frac{1}{2}$	13 $\frac{1}{2}$	12 $\frac{7}{8}$	12 $\frac{3}{4}$	12 $\frac{3}{4}$
3.65	3.6	3.6	3 $\frac{5}{8}$	3 $\frac{5}{8}$	3 $\frac{1}{2}$
100	100	100	3	8	3
8	8	8	3	8	3
19	17	15 $\frac{1}{2}$	15 $\frac{1}{2}$	15 $\frac{1}{2}$	14

REPORT

ON THE DRUG MARKET OF SAN FRANCISCO, CAL.

BY JAMES G. STEELE.

THE San Francisco Drug Market has of late years, more especially since the completion of the great Pacific Railroad, assumed most of the characteristics of the other great world centres for the importation and exportation of drugs, chemicals, crude and manufactured, fancy goods, druggists' sundries, etc.

The extremely favorable position of San Francisco, and the many lines of ocean steamers and railroads all converging to this port, has caused the market to assume a true cosmopolitan aspect, and the variety of importations is already enormous, only surpassed in this respect, perhaps, by London and New York.

Perhaps it is not too much to predict that San Francisco will be the centre of a vast future trade, greater than that which has been enjoyed by any city, ancient or modern, or that will be enjoyed by any city in the future. A glance at the map, or perhaps appeal to the memory, will illustrate more fully this prediction. Be it remembered that there are steam lines already established between this port and China, Japan, Honolulu, Auckland and Sydney, Mexico and Panama, and various South American ports, together with the local lines to Portland, Oregon; Victoria, Vancouver's Island; and the various California seaports, as well as communication by vessel with all parts of the world.

It is a common sight upon a Sunday or gala-day, when the ships riding in the harbor, or snugly cabled to the wharves, are all dressed in their best "bib and tucker," arrayed in bunting and ensigns of every hue and design, to note the flags of every commercial nation in the world.

Such is the extent and variety of our commerce, that a report on the *drug market* must of necessity glance at the various departments into which a systematic course of business divides the subjects of *imports*, *exports*, and *manufactures*, and, to be thorough, instance many things apparently foreign to the subject. These matters, however, are of interest, and, as we may say, so many links in the great chain of information, the desire for which not only prompts the traveller to remove to far tropical climes, but impinges him, transfused with a burning desire which no variation of temperature can reduce, far into the frozen regions of the North and South seas.

There are in San Francisco five large wholesale establishments, all carrying full and well-assorted stocks of such merchandise as is called for by the different retail stores, which depend mainly upon them for supplies.

The writer, in a conversation with the head of one of them, towards the close of the year 1878, was informed that a steady gradual decline in prices had been the leading feature of the business during the year just about closed. A large

quantity of goods had been turned out, the excess over the previous year being about commensurate with the increase of population on the coast, but owing to the reduced prices at which the goods had been sold the aggregate of sales and the profits realized showed no improvement on the business of 1877.

Owing to the time consumed by long voyages in getting supplies from distant sources, from which so many of the goods in this line must be obtained, and the time on which goods are sold in this market, a larger capital is required in carrying on the business here than elsewhere, which is not satisfactorily recompensed by the profits realized.

The terms on which goods in the drug and chemical line are sold in California and the Pacific States are sixty days from the end of the month in which purchases are made, to houses of approved credit, or three per cent. off for cash on delivery.

The completion of the trans-continental railroad opened the way for enterprising houses in the Eastern States, and California was quickly invaded by an army of commercial travellers (*i.e.*, "drummers"), who "cut a wide swath" in the trade of the Pacific States, and secured many orders from the retailers for their respective establishments, to the temporary disadvantage of the local wholesale dealers, who, as might be expected, look with extreme disfavor upon this phase of the business, and attempt, when possible, to prevent the retail trade from importing from Eastern and foreign markets.

This current, however, in time subsided, though not before leaving its impress on the local price-lists, which showed thereafter a marked decline compared with ante-railroad times.

Wonderful and exhaustless was the variety of goods offered, and seemingly innumerable the army of modern Huns invading this new Rome! Not only were there a "cloud of witnesses" representing the staples in drugs, chemicals, fancy goods, soap, perfumeries, druggists' sundries, etc., but the gentlemen representing the various "pharmaceutical specialties" seemed to rise in unending succession before an astonished gaze!

Many of these drummers, being well-travelled as well as educated gentlemen, obtained by their suave manners and persevering industry the attention of the majority of the pharmacists, and, what was perhaps of more importance to the introduction of their wares, the capture of the ear of the not always discriminating medical profession.

The result of this was speedily seen from the already well-filled stores of our retailers, crowded anew with a bewildering variety of manufactured goods of every description, to name which would transcend my space and patience. However, while so many pharmacists shirk the trouble of "manufacturing," and there exist so many wealthy firms but too ready to proffer what fashion and custom seem to require, and stand willing to act upon the least hint of novelty either in product, application, or style of putting up, the evil, if evil it be, will always exist, and new varieties of "elegant pharmaceuticals" continue to be added to our already groaning shelves.

The amount of business done in San Francisco for the year 1878 in drugs, chemicals, dye-stuffs, paints, oils, and other commodities immediately connected with the drug business amounted in round numbers to five millions of dollars (\$5,000,000). This city supplies nine hundred firms in the States and

Territories of California, Oregon, Utah, Idaho, Montana, Arizona, and Washington.

The prices of drugs, chemicals, etc., as will be seen by the price-lists in and appended to this report, compare favorably with the rates ruling in New York, Philadelphia, and other Eastern cities. "Corners" in special articles are almost unknown, although the San Francisco market obeys the impulse communicated by seasons of scarcity or otherwise, by the other great markets of the world, and a temporary advancement of prices is at times observed.

The retail drug trade of San Francisco is carried on by 120 houses, employing 240 assistants (all duly registered under the Pharmacy Act), ministering immediately to the wants of a population of 850,000 people. The annual sales of some of the largest amount to \$100,000. The needs of luxury no less than the necessities of misery are ministered to by them, and they can equally well fill at short notice an order for a fashionable lady's boudoir or supply the requirements of the sick-chamber.

The appointments of some of our fashionable drug stores have cost a fortune; the splendid plate-glass windows, marble-topped counters, elegant and well-filled show-cases, costly mirrors reflecting from innumerable points of view, speak rather of wealth and fashion than disease and its universally dreaded accompaniment,—death!

The evils of long hours and reduction in prices arising from keen and too often unworthy competition afflicts the trade here as in the Eastern cities.

In view of the peculiar nature of the profession, it seems as though a mutual aid society based upon the rules and practice of some of the secret orders would prove beneficial.

In order to give a fair exhibit of the different branches of the *drug business*, I have thought proper to divide the subject-matter of this report into several distinct heads, each to be subdivided as follows:

PART I.—*Imports* of drugs, chemicals, fancy goods, glassware, paper, perfumery, soaps, wines, etc., and sundry articles more or less handled by the trade.

PART II.—*Natural products*, comprising facts and statistics concerning metals, minerals, mineral springs, organic matters, vegetable products, etc.

PART III.—*Manufactures*, including under this head remarks upon the extent and variety of manufactures of acids, alcohol, chemicals, glassware, oils, papers, powder, spirits, comprising wines, brandies, liquors, etc.

PART IV.—*Exports*, comprising statistics and other information relating to articles exported and passing through the hands of the drug trade, such as drugs, chemicals, ginseng, borax, oils, plants, quicksilver, wines, brandies, etc., the whole to be followed by

PART V.—*A Table* giving prices of California medicinal plants.

Some omissions and perhaps errors may be noted in this report. Compiled as it has been during the few hours of leisure snatched from absorbing business engagements, and with a discouraging lack of appreciation and assistance too often from those in a position to give information of interest and value, it is respectfully offered to the Association as being, I believe, the first exponent of the business and resources of the Pacific States from a point of view

likely to prove interesting to the great body of pharmacists and druggists throughout the Union, to whom the word *California* is more apt to symbolize an "unknown quantity" than otherwise.

The following were the rates held by jobbers for principal drugs, chemicals, etc., at the beginning of the present year:

Acid, acetic, . . . 18 to 22½ c. per lb	Oil, sassafras, . . . 90 per lb.
" citric, . . . 75 to 80 "	" wintergreen, . . . 8 50 "
" oxalic, . . . 18 to 20 "	Opium, . . . \$5.00 to 5.50 "
" tartar. cryst., 55 to 60 "	Phosphorus, . . . 1 00 to 1.25 "
" " powd., 55 to 60 "	Prussiate potash, . . . 35 to 40 "
Alcohol, . . . \$2.40 to \$2.45 per gal.	Roots, ginger, Jam., . . . 27½ "
Arsenic, . . . 5 to 6 c. per lb	" " unbleached, 22½ "
Balsam copaiba, . . . 80 to 85 "	" ginseng, . . . 1.10 to 1.15 "
Cassia buds, . . . 60 to 65 "	" golden seal, . . . 30 to 33 "
Chloral hydrate, . . . \$2.25 "	" ipecac, . . . 1.62½ to 1.75 "
Chlorate potassium, 30 to 35 "	" licorice, . . . 30 to 50 "
Cream tartar, . . . 35 to 40 "	" sarsaparilla, 15 to 45 "
Cutch, . . . 7½ to 8 "	" seneka, . . . 1.00 to 1.15 "
Glycerin, . . . 30 to 37½ "	Seeds, canary, . . . 5 to 7 "
Gum acacia, . . . 25 to 60 "	" cardamom, . . . 2.25 "
Iodide potassium, \$4.45 to 4.60 per lb.	" coriander, . . . 15 to 20 "
Iodine, . . . 6.00 "	" hemp, . . . 8 to 10 "
Insect powder, . . . 55 to 65 c. per lb.	" mustard, . . . 8 to 9 "
Morphine, . . . \$4.25 to \$4.37½ "	" " black, 11 to 12½ "
Oil, anise, . . . 2.75 "	Shellac, . . . 27 to 30 "
" cassia, . . . 1.75 "	Sulphur, flor., . . . 4 to 5½ "
" citronella, . . . 1 25 "	Strychnine, . . . 1.70 per oz.
" bergamot, . . . 4.00 "	Tonka beans, . . . 1.75 per lb.
" lemon, . . . 3.50 "	Vanilla " . . . 8.50 to 10.50 "
" peppermint, . . . 4.00 "	Venice turpentine, 50 to 55 "
" rose, . . . 12.00 per oz	Vaseline, . . . 90 "

Imports of drugs and chemicals from foreign countries for the year 1878 were as follows,—in value:

From	Drugs and Dyes.	Chemicals.
Mexico,	\$188,667 00	
China,	41,205 00	\$33,282 00
Tabiti,	20,483 00	4,512 00
England,	18,173 00	56,723 00
France,	8,803 00	18,614 00
Germany,	6,251 00	2,207 00
Japan,	8,914 00	8,837 00
British East Indies,	3,699 00	
Sandwich Islands,	672 00	162 00
Scotland,		582 00
Australia,		545 00
Total,	\$291,817 00	\$119,914 00

Imports of saltpetre :

	Pounds.	Value.
Great Britain,	2,246	\$140 00
British East Indies,	224,894	2,230 00
Total,	227,134	\$2,370 00

Cochineal :

	Pounds.	Value.
Central America,	8,703	\$6,689 00
Chili,	1,850	1,327 00
Total,	10,553	\$8,016 00

Nitrate of soda :

	Pounds.	Value.
Peru,	7,661,725	\$207,165 00
Chili,	554,400	16,066 00
Total,	8,316,125	\$223,231 00

Totals.	Values.
Soda, bicarb.,	\$13,283 00
“ ash,	51,845 00
“ caustic,	69,807 00
Saltpetre,	2,370 00
Cochineal,	8,016 00
Nitrate soda,	223,231 00
Drugs, unspecified,	291,817 00
Chemicals, unspecified,	119,914 00
Total,	\$780,283 00

Imports of drugs and medicines during the year were large. The total of business done amounted to an increase of five per cent. over that of the preceding year. Imports of one of the leading articles in the list, though not one much affected by Caucasian druggists, that of

Chinese opium, has been as follows for the past three years:

	Pounds.	Value.
1876,	46,504	\$474,828 00
1877,	56,808	\$590,911 00
1878,	66,353	\$681,677 00

The quantity and value of this article has thus increased one-third.

The principal fluctuations in the drug market during the year were in the article of sulphate of quinine. It closed in 1877 at \$3.50, dropped to \$3.25 in February, advanced to \$4.50 in March, dropped to \$4.00 in May, and \$3.75 in June. In August there was an advance of 75 cents. In October it dropped to \$4.15, and closed at \$4.00.

Morphine dropped from \$4.75 at the beginning to \$4.25 at the close of the

year. Calomel declined, while corrosive sublimate closed at 90 cents, strychnine at \$1.70, an advance of 15 cents, and glycerin at 25 and 30 cents, not changing much within the year. Gum shellac, which closed in 1877 at 85 and 40 cents, was down to 27½ cents, but closed at 85 cents. Canary seed was down to 5 and 7 cents, two cents lower than at the same time a year previous. Hemp seed closed at 8 cents, while coriander advanced to 15 and 20 cents.

TRADE NOTES ON IMPORTED CHEMICALS FOR THE YEARS 1875 TO 1878 INCLUSIVE.

1875. For the manufacturers of English chemicals this year was one of great depression and continuous losses. Our local consumers benefited by the low rates of the year. Caustic soda ranged from 4 to 5½ cents, closing at 4½. In 1874 the average was 7½ cents. The rate for bicarb. soda for the year was 5½ cents, 1874 averaging 7 cents. Soda ash was thrown recklessly on the market. Bleaching powder largely overstocked, owing to the temporary stoppage of the paper mills (local). A lot of damaged chloride also served to depress prices. Makers of English chemicals complain bitterly of the low prices ruling for 1874 and 1875, and assert that the business resulted in loss to them. This is explained from several rival houses here overstocking in advance of the market. January 1st, 1875, of caustic soda there was five months' supply on hand; bleach, six months' consumption; caustic, about five months' supply. Soda ash, the market fully supplied and large quantities in stock, Bicarb., the supply of American make, though inferior, has kept down prices, though not to shut out English. The agents of the American article are pushing the market very hard, and large quantities of Eastern soda are in transit. An effort is now being made to manufacture bicarb. soda from the crude soda found in Nevada. That soda is carbonated soda ash, and doubtless will produce all the chemicals of which that alkali is the base.

Alum advanced during the year ½ and ¾ cents per pound, quotable at 4½ cents jobbing. Brimstone has been largely imported from Japan on account of the local acid factories. Now, however, and for some months, we have been receiving supplies from Nevada, selling from \$40.00 to \$50.00 per ton. Roll advanced 1½ to 4¾ and 5 cents at the close of the year.

Cream tartar in crystals was unchanged at 41 cents.

Carbolic sheep-wash declined from \$3 00 to \$1.75 owing to excessive importation. Copperas was firm all the year at 8 cents. Iodide of potash, \$6.00 on beginning of 1874, and \$3 50 at its close, has now declined to \$3.25. Morph. sulph. has fallen from \$6.50 to \$4 50 and \$5.00.

Phosphorus, \$1.20 at beginning of year, was quotable at \$1.15 and \$1.20, remaining without change.

Potass. bichrom. weakened to 22½ and 25 cents. Red prussiate advanced to 17½ cents, and yellow fell to 38 and 40 cents. Chlorate advanced to 37 cents. Sal nitre advanced to 12 and 15 cents. Soda hyposulph. advanced to 8½ cents. Soda nitrate is laid down here at 2½ cents, and there were four cargoes imported from Peru in 1875, used chiefly in the manufacture of powder.

Sulphate of copper was quotable at 8½ cents beginning, and closed at 9½ and

10 cents. That used in this State, however, is manufactured principally in this city, importations, consequently, being light. Sulphate of quinine has declined from \$2 40 to \$2.25. Sulphur flor. has been in demand at 5½ to 6 cents.

1876. In English chemicals the experience of 1875 was renewed. The beginning of the year showed a heavy surplus stock of caustic, bicarb., and soda ash in the hands of importers and consumers. Through importations the glut continued. Caustic soda was sold at 4½ cents duty paid. Bicarb. weak at 4½ cents. Soda crystals, owing to the increased product of the Pacific Soda Company, cannot be imported without loss. In bicarb. the local product has toned down the market. The consumption of bleaching powder or chloride of lime has not increased, and ship-owners object to taking it at ordinary rates of freight. Nevada sulphur has been delivered in the city in large quantities during the year. The consumption of sulphur on this coast is about 3000 tons per annum, Nevada being well able to supply the demand. It is sold here at \$40.00 per ton, Sicily sulphur being held firm at \$45.00.

Alum has been in good supply, and is quoted at 3 cents as against 8½ cents a year since. Acids have been in moderate demand, and no change in price. Citric has deviated from \$1.00 and \$1.05 to 95 cents. Tartaric has weakened to 55 cents. Carbolic sheep-wash is \$2.00, an advance of 25 cents during the year. Copperas closed at 2½ and 2¾ cents. Roll brimstone is less than a year since, 4 and 4½ cents. Potass. bromide advanced from 65 to 70 cents. Potass. iodide closed at \$2.75, a decline. Potass. bichrom., 20 cents as against 25 cents last year. Chlorate weakened to 35 cents. Sal nitre remained unchanged at 12 and 15 cents. Sul soda has been in fair demand. Sulphur flor. nominal.

1877. With the exception of caustic and sal soda there has been a heavy decline in the importation of all the leading articles of chemicals during the year. The depression in the home markets still continues. The Lancashire (England) makers of caustic soda, ash, and bicarb. having lost heavily during the past three years, it is now proposed to close their works for some time early in the year, and thus restore the tone of the market. The owners of salt mines have also combined to advance the price of salt. Freights are ruling very high at Liverpool, and owners decline to contract for forward shipment. Buyers of chemicals must therefore expect to pay better prices than have ruled for some time.

Alum is quotable at 4½ cents, an advance of 1½ cents for the year. There has been little, if any, change in manufactured acids. Citric has dropped to 80 cents, a decline of 15 cents. Tartaric is 55 cents, the same as a year since. Copperas advanced ¼ to 2½ cents. Phosphorus is \$1.10, a drop of 15 and 40 cents in the year. Potass. bichrom. advanced 5 to 25 cents. Bromide to 70 and 80 cents. Chlorate, 35 cents, unchanged. Iodide advanced \$1.00 to \$3.75. Prussiate (yellow) is 33 cents, about the same at January 1st, 1876.

Sal nitre has advanced ½ and 1 cent to 15 and 16 cents. Soda hyposulphite advanced from 6 to 7 cents. Quotations at close of year were: caustic soda, 5½ cents, to arrive; soda ash do., \$2.60; Kurtz's do., 8 and 8½ cents; sal soda, English, \$2.12½, to arrive \$2.00; soda bicarb., English, 5 cents, to arrive 4½ cents; California, 4½ cents; acid nitric, 12 and 15; muriatic, 6 cents; sul-

phuric, $2\frac{1}{2}$ and 4 cents; Nevada soda, crude, $2\frac{1}{2}$ and $2\frac{1}{2}$ cents; sulphur, Nevada, crude, 2 cents; refined, $2\frac{1}{2}$ cents; Sicily, crude, $2\frac{1}{2}$ cents.

1878. Imports of alum have been larger than in three years past. Those of brimstone have fallen short of those of 1876, but exceeded those of last year. Those of sulphur have exceeded the imports of both 1876 and 1877. Cream tartar has also been imported in excess. Nitrate of soda has arrived from Peru in about double the quantity of 1877, but only about two-thirds of that for 1876. Imports of sodas from England have been mainly large, those of bicarb. especially, but soda crystals have been received in diminished quantity.

Imports of blue vitriol have been large. Prices of English chemicals have been low during the year, the market being overstocked by the importations of rival houses. Early in the year caustic soda was sold by auction to relieve the market, sales being made at $4\frac{1}{2}$ and $4\frac{3}{4}$ cents. In July it brought only \$4.37 $\frac{1}{2}$, and has been low ever since. Alum has changed little during the year. It is, however, weaker than at the close of 1877.

Sulphur in bulk, California and Sicily, sells at \$40.00 to \$50.00 per ton. The receipts of nitrate of soda have been larger than usual, while the demand has been smaller. Cream tartar closed at 85 cents in a jobbing way. There were but little changes in acids during the year.

Potassium iodide sold at the commencement of the year at \$4 25 as against \$3.75 at the beginning of 1877, and bromide at 65 cents against 75 and 80 cents then. Potass. chlorate was held at 80 cents, a decline of 5 cents during the year. Hyposulphite of soda closed at 6 and 7 cents. Copperas advanced $\frac{1}{2}$ cent, closing at $2\frac{3}{4}$ and 3 cents. Sal nitre closed at 15 and 18 cents, as against 15 and 16 cents in 1877.

Prices at the beginning of the present year ruled as follows: Caustic soda, $4\frac{1}{2}$ cents; soda ash, $2\frac{1}{2}$ and $2\frac{1}{2}$ cents; Kurtz's, 3 cents; sal soda, English, \$2 00; Nevada, \$1.75; bleaching powder, $2\frac{3}{4}$ cents; soda bicarb., English, $4\frac{1}{2}$ and $4\frac{3}{4}$ cents; California, 4 cents; acid nitric, 12 and 15 cents; muriatic, 6 cents, and sulphuric $2\frac{1}{2}$ and 4 cents; Nevada soda, crude, $2\frac{1}{2}$ and $2\frac{1}{2}$ cents; sulphur, Nevada, crude, 2 and $2\frac{1}{2}$ cents; refined, 3 cents; Sicily, crude, 3 cents; refined, $3\frac{1}{2}$ cents; French, refined, $5\frac{1}{2}$ and $5\frac{3}{4}$ cents; do., ground, 4 and $4\frac{1}{2}$ cents.

The following table represents the *imports of drugs, chemicals, etc.*, for 1877:

Camphor,	.	.	.	87 boxes.	Dye stuffs,	.	.	.	2 kegs.
Cochineal,	.	.	.	6 boxes.	"	.	.	.	7 casks.
"	.	.	.	15 bbls.	"	.	.	.	245 pkgs.
Drugs,	.	.	.	549 pkgs.	Extracts,	.	.	.	75 cases.
"	.	.	.	33,867 boxes.	"	.	.	.	8 bbls.
"	.	.	.	479 bbls.	Florida water,	.	.	.	1010 cases.
"	.	.	.	164 bbls.	Fullers' earth,	.	.	.	1 box.
"	.	.	.	98 kegs.	Gambier,	.	.	.	86 pkgs.
"	.	.	.	82 casks.	Gelatin,	.	.	.	50 cases.
Dye woods,	.	.	.	548 bbls.	Ginseng,	.	.	.	509 casks.
"	.	.	.	22 casks.	"	.	.	.	273 bbls.
Dye stuffs,	.	.	.	165 cases.	"	.	.	.	1 keg.

Ginseng,	54 boxes.	Perfumery,	417 cases.
"	1 tierce.	"	1000 boxes.
Gum,	4 bbls.	"	48 pkgs.
Glycerin,	55 cans.	Shellac,	205 cases.
Gum arabic,	33 cer's.	Sumac,	1268 boxes.
Indigo,	3 cer's.	"	135 boxes.
"	55 cases.	Terra alba,	31 casks.
Lye,	2902 cases.	"	10 bbls.
Logwood ext.,	204 boxes.	Water, aerated, mineral,	41 pkgs.
"	145 bbls.	" " "	1600 bsks.
"	19 casks.	" " "	959 cases.
"	224 pkgs.	" " "	8 casks.
"	1506 sticks.	" " "	202 bbls.
Opium,	1217 boxes.	" " "	345 hmps.
Orange flower water,	18 pkgs.	" " "	25 crates.
Oils, essential,	52 boxes.	Woad,	5 casks.

Imports of Drugs, Chemicals, etc., 1877—Countries and Values Specified.

Central America :

	Quantity.	Value.
Cochineal,	8,703 lbs.	\$6,689 00

China :

Chemicals,		83,282 00
Drugs and dyes,		41,205 00
Glassware,		5,239 00
Oils, nut,	318,380 gals.	171,581 00
Opium,	66,358 lbs.	681,677 00
Spices,	431,770 lbs.	51,729 00
Spirits, in casks,	8,161 gals.	1,437 00
" in bottles,	5,937 doz.	6,684 00

Chili :

Cochineal,	1,850 pkgs.	1,327 00
Drugs and dyes,		2,876 00
Linseed,	15,228 bushels.	26,221 00
Nitrate of soda,	554,000 lbs.	16,066 00

British East Indies :

Drugs, dyes, etc.,		8,699 00
Linseed,	70,888 bushels.	106,477 00
Saltpetre,	224,894 lbs.	9,230 00
Spirits, in casks,	546 gals.	285 00

British Possessions, Australasia :

Chemicals,		545 00
Tin, bars,	5,590 cwt.	85,179 00

England :

	Quantity.	Value.
Chemicals,		\$56,723 00
Drugs and dyes,		18,178 00
Fancy goods,		50,905 00
Glassware,		35,024 00
Olive oil,	4,643 gals.	9,072 00
Salt,	7,825,590 lbs.	84,773 00
Saltpetre,	2,240 lbs.	140 00
Soda bicarb.,	681,500 lbs.	13,288 00
“ ash,	4,918,122 lbs.	50,046 00
“ caustic,	2,687,694 lbs.	69,807 00
Spices,	25,085 lbs.	7,670 00
Spirits (casks),	88,724 gals.	88,935 00
“ (bottles),	2,784 doz.	10,225 00
Tin, bars,	295 cwt.	5,423 00
“ plate,	88,040 cwt.	406,944 00
Wine (casks),	88,805 gals.	80,389 00
“ (bottles),	6,240 doz.	40,694 00
Zinc (sheet),	22,218 sheets.	1,425 00

France :

Chemicals,		18,614 00
Drugs, dyes, etc.;		8,803 00
Fancy goods,		15,305 00
Glassware,		18,782 00
Olive oil,	89,608 gals.	70,841 00
Spirits (bottles),	4,678 doz.	25,836 00
“ (casks),	22,890 gals.	25,368 00
Sulphur, refined,	1,787 cwt.	4,260 00
Wine (casks),	413,098 gals.	149,287 00
“ (bottles),	15,850 doz.	78,273 00

French Possessions, Pacific :

Chemicals,		4,512 00
Drugs, dyes, etc.,		20,933 00
Fancy goods,		87 00
Glassware,		252 00

Germany :

Chemicals,		2,207 00
Drugs, dyes, etc ,		6,251 00
Glassware,		28,259 00
Spirits (casks),	3,732 gals.	1,529 00
“ (bottles),	870 doz.	4,198 00
Wine (casks),	694 gals.	477 00
“ (bottles),	1,308 doz.	9,677 00
Zinc, sheet,	188,245 lbs.	8,415 00

Japan :

	Quantity.	Value.
Chemicals,		\$8,837 00
Drugs, dyes, etc.,		8,914 00

Mexico :

Drugs, dyes, etc.,		188,667 00
Spices,	10,188 lbs.	2,427 00
Spirits (casks),	66 gals.	80 00
Salt,	1,784,080 lbs.	8,054 00

Peru :

Nitrate of soda,	7,661,725 lbs.	207,165 00
Salt,	2,614,080 lbs.	6,000 00

Sandwich Islands :

Chemicals,		162 00
Drugs, dyes, etc.,		672 00

Scotland :

Chemicals,		582 00
Spirits (casks),	4,573 gals.	8,468 00
" (bottles),	85 doz.	177 00

Total Imports, 1878.

	Value.
Cochineal,	\$7,016 00
Chemicals,	119,914 00
Drugs, dyes, etc.,	284,698 00
Fancy goods,	66,247 00
Glassware,	87,556 00
Linseed,	132,698 00
Nitrate of soda,	228,231 00
Nut oil,	171,581 00
Olive oil,	79,918 00
Opium, Chinese,	681,677 00
Salt,	43,827 00
Saltpetre,	9,370 00
Soda ash,	50,046 00
Soda bicarb.,	18,288 00
Soda caustic,	69,807 00
Spices,	61,826 00
Spirits,	118,102 00
Sulphur, refined,	4,260 00
Tin bars,	90,602 00
Tin plate,	406,944 00
Wine,	804,817 00
Zinc,	9,840 00

Acids.—Before the establishment of local acid works all the acids supplying the Pacific Coast (nitric, muriatic, and sulphuric) were sent in carboys by

sailing vessels around Cape Horn. This was not considered a desirable item of freight, and was always made a deck load, so that it could be cast overboard on the first appearance of a storm or heavy gale, as not unfrequently occurred. Fancy prices in consequence often ruled, and not until the above-mentioned works were well established and in full operation was the market kept in uniform supply.

The mineral acids are manufactured and sold at a rate to almost keep out of market the Eastern-made acids, although carboys of the Philadelphia manufacture are kept in stock by the wholesale houses. The rates per carboy have been for nitric acid, 12 to 15 cents; muriatic, 6 cents; and sulphuric, 2½ to 4 cents per pound. For chemically pure, in one-pound g. s. bottles, 62½ cents per bottle.

Acetic Acid.—In the market of San Francisco this acid, in conjunction with many other chemicals, is found of various Eastern and European manufactures. Price for No. 8, in four-pound bottles, per pound, 80 cents.

Carbolic Acid.—Calvert's English acid of different grades seems to be mostly preferred. Merck's is much cheaper, and seems nearly if not equally as good. When liquefied by maceration in a water-bath, a small percentage of water or glycerin added, it remains uniformly liquid and suitable for dispensing. Prices are quoted for Calvert's No. 1, \$2.25; No. 2, \$1.75; and Merck's, 75 cents per pound.

Citric Acid is imported and used in limited quantities by pharmacists, confectioners, etc. It has been found adulterated to some extent with crystals of tartaric acid. Its price declined from \$1.40, in the beginning of 1875, to 75 and 80 cents at the close of 1878. Attempts made to learn the precise amount of this and other acids imported and sold have not proved successful, owing to so large an amount of such stock being imported under the general name of "chemicals."

Phosphoric Acid.—Glacial phosphoric acid, both Eastern and European, is found in the market. This acid, and its various pharmaceutical compounds, are in large esteem by our physicians, and in consequence largely dealt in by the trade. Preference seems to be given to the stick phosphoric acid over the old familiar style of lumps or irregular pieces. The question of adulterations does not seem to deter the buyer, and *looks* carry the day in this as in many other articles.

Salicylic Acid.—This acid, just now a "protected pet" of the prescribing world, is on hand in every variety of style and price. The American acid is doubtless as good as the foreign, and preferable on account of lower price. Price, per ounce, 35 cents for Lehn and Fink's; per pound, \$3.75.

Tartaric Acid.—Tartaric acid is imported in crystals and in powder, although we learn that some lots have been powdered here. Price has remained uniform throughout the year, crystals selling at 60 cents, and powdered at 65 cents per pound.

Cream of Tartar.—It might seem that sending cream of tartar to California would be very much like "coals to Newcastle." A wine-producing State like California should not be obliged to send to foreign parts for what could be produced in large quantities at her own doors. Time will doubtless lead

to the establishment of works devoted to this industry. Cream of tartar is selling at 35 to 45 cents per pound.

Iodine and its preparations are largely dealt in by the trade. Most of it is imported from England, although the resublimed of the Eastern houses is well represented. In the trade chance shipments of first sublimation are met with at \$2.75 per pound. The resublimed large scales sell at 45 cents; per pound, \$6.50.

Corks.—This branch of trade on the Pacific Coast has changed from the handcut, shapeless Spanish goods to the perfect cylindrical machine-cut corks of the United States. The market is always well supplied with different grades and styles of corks of all sizes from American manufactories. Bottlers of wines and liquors, as well as druggists, appreciate and take advantage of this happy state of affairs. Imports of corks for the last three years were:

	1876.	1877.	1878.
Bales,	626	454	877
Bags,	512	9	845
Packages,	99	818	162

Castor—Siberian castor is to be found here to the exclusion of Russian castor. Large quantities of the former are occasionally imported, selling at \$1 50 to \$2.00 per pound.

Flowers.—The following are the flowers most sought for in the trade: Arnica, chamomile (both German and Roman), lavender, malva, orange, rosemary, tilia, and violet. Flowers, in common with other vegetable products, can be kept a long time in California with ordinary precautions.

Glue—The importation of foreign glue has about ceased. Several houses here turn out a liberal supply of all goods, from common to the best bonnet-bleached. It can be had at prices ranging from 18 to 80 cents, according to quality and manufacture.

Gums.—All grades of gum arabic and Senegal are found in San Francisco. It is imported in original packages. Prices range from 20 to 65 cents per pound, according to quality and color. Some years since, a gum from the interior of Mexico ("*Mesquite*") came into port, and was thought to possess unusual adhesive properties, which were, on experiment, not proved. But one importation was received, as it met with no encouragement here. Gum benzoin, camphor, kino, mastic, myrrh, and tragacanth are most largely dealt in at prices ruled to a great extent by the market in New York and Europe.

Musk.—There is no article known to the trade so liable to sophistication as musk. The best pods are sold here at \$30 per ounce. Grain musk of good quality can be had at \$40 per ounce. Canton, in lead cans holding an ounce each, sell at 75 cents each. Siberian musk pods have been seen in this market. They are inferior, and used for "trade purposes."

Dye Stuffs.—The following are mainly imported from Eastern and European sources: anatto, anilin colors, curcuma, logwood, madder, indigo, orchilla, and woad. Anatto is of importance in cheese and butter making. Anilin colors can be had at slight advance on New York rates. Curcuma is in fair demand, and with logwood, madder and woad is used by confectioners and dyers. Orchilla (*Roccella tinctoria*) is found in large quantities on the

peninsula of Lower California. In 1874, 8625 bales, and in 1875, 8972 bales, were brought here in coasting vessels, and transhipped to Liverpool, England. Orchil, cudbear, and litmus are made from these lichens.

Glassware.—A statement of the amount and variety of druggists' glassware brought into this port would cover many pages. Not more than a passing glance can be given to this interesting branch of the trade. Of flintware we have a full variety from all the different Eastern and European factories. Since January 1st, 1878, the local glass-works have come into powerful competition with Eastern and European makers.

Malt Liquors.—In 1877 there was a large increase over the imports of 1876, although imports have been only about equal to consumption. Importations from Chicago and St. Louis were large, and sold well. The quantity manufactured in the city and suburbs during the past year (1878), showed an increase. Consumption of Eastern was large, while that of foreign decreased. The following brands controlled the demand during the year, and the following shows the quantities imported :

Foreign Ales and Stout in Bottles.

Burke's,	2300 cases.	Shepton Mallet's,	200 bbls.
Tennent's,	1800 bbls.	Byas's,	150 "
Blood's,	2600 "	Bridge's,	100 "
Johnson's,	900 "	Worthington's,	200 "
Hibbert's,	800 "	Ind. Coopers,	150 "
Hall's,	800 "	Copenhagen Beer,	800 "
Foster's,	300 "	German,	300 "

Foreign Ales and Stout in Bulk.

Joule's,	250 hgds	Guinness's,	20 hgds.
Bass's,	60 "	Merriam's,	50 "

Eastern Beer.

From Milwaukee and St. Louis,	15,000 pkgs.
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There were Imported,

In 1876,	25,470 packages; consumed,	22,440 packages.
In 1877,	26,850 " "	27,745 "
In 1878,	29,083 " "	32,383 "

Quotations for 1878 (closed January 1st, 1879), were :

English Bottled Beer.

Arrol's pale ale,	\$3 00 and \$3 50
Tennent's porter,	3 00 3 50
" ale (qts. and pts.),	3 00 3 50
Guinness stout, Johnson's,	3 50 3 70
Blood, Wolf & Co.'s XXX ale and porter (pts.),	3 50
Bass's porter (qts.),	3 50 3 75

Hibbert's porter (qts. and pts.),	.	.	.	.	.	\$8 37½ and \$3 50
Shepton Mallet's,	.	.	.	.	.	8 00 8 50
Brewery ale (pts.),	.	.	.	.	.	8 00 8 25
Guinness stout, Burk's,	.	.	.	.	.	8 75 4 00
Worthington's ale,	.	.	.	.	.	8 50 8 70
Younger's ale,	.	.	.	.	.	8 25 8 50
McKenen's ale,	.	.	.	.	.	8 50 3 75
Tennent's stout,	.	.	.	.	.	8 50 8 72

English Cask Beer.

Joule's,	.	.	\$50 00 and \$57 60	Stout,	.	.	\$45 00 and \$50 00
Bass's ale,	.	.	45 00	Morrison's ale (bulk),	.	.	46 00

Bavarian Beer.

Carl Nihlas,	\$4 00 and \$4 50
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California Ales and Porter.

Ales (pts.),	\$2 00	Porter double doz. (pts.),	.	\$2 75
" (qts.),	2 50	" single doz. (qts.),	.	2 50
						" casks,	.	85 00

Eastern.

St. Louis lager (bbls.),	.	.	\$16 00	J. Schlitz's Milwaukee (doz.),	\$8 50
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Matches.—Wax, wood, and parlor matches have been freely imported in times past, but since the manufacture of this important stock by local makers the importations have declined.

Molasses and Syrups.—Imports for the years 1877 and 1878 were as follows:

	1877.		1878.
Hawaiian,	2606 bbls.	Hawaiian,	2186 bbls.
"	798 kegs.	"	162 kegs.
Eastern,	860 bbls.	Eastern,	15,450 bbls.
"	10 half bbls.	"	27 half bbls.
"	14 casks.	"	30 casks.
"	7894 kegs.	"	2716 cases.
"	984 pkgs.	"	2 puncheons.
		"	9778 kegs.

The receipts of *Hawaiian* fell off 16 per cent. as compared with those of 1877, while *Eastern* increased. Quotations of January 1st, 1879, were: California golden, 70 cents for 1 gallon tins, 60 cents for keg (5 and 10 gallons), 55 cents for half barrels, 52½ cents for bbls.; for export, 35 cents in half barrels; Salt Lake, Idaho, etc., 42½ cents, 45 cents, and 50 cents, according to package; Hawaiian, 16 cents; Eastern, barrels, 60 cents; kegs, 65 cents.

Naval Stores.—Imports for the last two years were:

	1877.		1878.
Oakum, . . .	600 bbls.	Oakum, . . .	2321 bales.
" . . .	2672 bales.	Turpentine, .	18,867 cs.
Turpentine, .	16,239 cs.	Pitch, . . .	1092 casks and bbls.
Pitch, . . .	8831 casks and bbls.	Rosin, . . .	10,296 bble.
Rosin, . . .	15,214 bbls.	Tar, . . .	668 casks and bbls.
Tar, . . .	895 casks and bbls		

Imports for 1878 fell off considerably as compared to those of 1877. Prices fell, save with turpentine, which closed $2\frac{1}{2}$ cents higher than a year previous. Rosin declined $83\frac{1}{2}$ per cent. Quotations January 1st, 1879, were: Rosin, common to pale, \$2.25 and \$3.25; tar, \$4.50 and \$5.00 for Eastern, and \$8.50 for Swedish; pitch, \$3.25 and \$3 75; chains and cables, 5 and 7 cents; anchors, 6 and 7 cents; turpentine, $47\frac{1}{2}$ cents; jobbing, 50 and $50\frac{1}{2}$ cents; oakum, \$4 00 California, \$4.00 and \$4.50 Eastern.

Oils, Essential.—In the matter of essential oils not much can be said. New York being the recognized grand receiving and distributing centre of the Union, is the port to which most of the essential oils, essences, and pomades in bulk are sent. As is well known, all the European manufacturers and leading houses have their agencies in New York, and resign all local trade to their hands. It is therefore the rule for our wholesale houses to import their oils from New York, sometimes getting them in original packages. Of the American-made oils, the best qualities are sold here at a fair advance on manufacturers' prices.

Oil bergamot, cassia, cloves, lemon, lavender, neroli, rose, sandal-wood, thyme, and wintergreen are most in demand, being chiefly used for perfumery, confectionery, and the manufacture of essences.

Oils, Kerosene, Etc.—The imports for 1878 were:

Benzine, . . .	805 cs.	Kerosene, Cal., . . .	6 cars.
Cocoanut oil, .	8 casks.	Lard oil, . . .	2996 bbls.
" . . .	62 packages.	" . . .	1007 cs.
Castor oil, . .	1658 cs.	Machinery oil, . .	25 bbls.
" . . .	98 bbls.	Naphtha, . . .	8150 cs.
Gasoline, . . .	860 cs.	Nut oil, . . .	22,152 cs.
" . . .	915 bbls.	Palm oil, . . .	13 casks.
" . . .	9 cars.	Tar oil, . . .	13 bbls.
Kerosene, . . .	335,780 cs.	Unspecified oil, .	2149 bbls.
" . . .	2014 bbls.	" . . .	2878 cs.
" . . .	38 tank cars.	" . . .	2 cars.
" Cal., . . .	4521 bbls.	Machinery oil, . .	1 car.
" " . . .	15 cs.	Whale oil, . . .	9308 bbls.

The market in the above articles was noted for a decline during the year. Imports of kerosene were heavy, and prices dropped to a low figure. The following is a table of imports, etc., for the years 1876, 1877, and 1878:

Imports.	1876.	1877.	1878.
Cases,	269,980	328,600	885,730
Stock in San Francisco January 1st, 1878, .		760,000 gallons.	
Imports, 1878,		8,551,800	"
Receipts Cal. kerosene, 1878,		217,811	"
Total available for consumption,		4,529,111	"
Stock in S. F. Jan. 1st, 1879, 860,000 galls.			
Exports, 1878,	824,180		"
		1,184,180	"
Consumption and distribution, 1878,		8,344,931	"
" " 1877,		2,995,941	"
" " 1876,		2,285,629	"

Castor Oil.—The market opened at \$1 10 for California, and remained at that figure a long time. Sales were equally divided between native and imported.

Lard Oil.—The market has been low East, and correspondingly here. Imports considerably exceeded those of 1877.

Linseed oil has not experienced many fluctuations. It dropped to 72 cents for raw and 75 cents for boiled towards the middle of the year, and afterwards advanced to present rates.

Nut Oil.—Imports fell about 6000 cases short of those of 1877. Amongst the most notable fluctuations were an advance to 90 cents in June and July, a decline to 68 cents, and an advance again to 70 cents, and a further decline to present rates.

Whale Oil.—The catch for the year (1878) was less than in 1877, the total being about 16,000 barrels, of which the quantity stated below came to this port. The first of the catch sold at about 40 cents, but upon more arrivals the price declined to 35 cents.

Imports of whale oil from the years 1873 to 1878, inclusive, were

1873,	11,818 barrels.	1876,	2,880 barrels.
1874,	10,568 "	1877,	18,879 "
1875,	17,805 "	1878,	9,808 "

The following was the price-list for oils, etc., January 1st, 1879 :

Castor oil, diamond Cal., \$1 30	Kerosene, Defiance,	45 per gal.
and \$1.35 per gal.	" Oleofine,	44 "
" Baker's A. A., 1.40 "	" Silver Light,	44 "
" other brands,	" Starlight,	44 "
\$1.20 and 1.35 "	" Sunlight, 44 and 45	"
China nut oil, 67½ and 70 "	Lard oil, \$1.07½ and \$1.15	"
Cocoanut " 80 and 90 "	Linseed oil, Cal. raw,	75 "
Gasoline, 30 and 32 "	" " boil., 75 and 80	"
Kerosene, Astral, 50 and 55 "	" Eastern, 75 and 80	"
" Devoe's, 44 and 50 "	" English, 80 and 85	"
" Donner's, 48 and 50 "	Nentsfoot oil, 1.00 and 1.10	"
" Eureka, 44 and 47 "	Whale oil,	40 and 45 "

Opium.—This drug, though classed among the gums, seems to be of a distinct character from its complexity of composition, etc. The favorite brand sold here is the Smyrna opium, and comes to San Francisco from New York, where, if possessing the requisite percentage of morphia, it is passed through the custom-house.

Chinese opium is largely imported into San Francisco, and used by the devotees (mostly Chinese) of the opium-smoking habit. This is a watery extract of the India opium, and contains a light percentage of morphia. The duty on Chinese opium is 100 per cent. ad valorem, and brings the market price to \$12.00 and \$14.00 for 10 taels; a tael weighing 1½ ounces avoirdupois. Smyrna opium sold for \$9 50 in the middle of 1875 to \$5.50 at the beginning of 1879, and at present is held at the latter rate.

The following are the *imports of Chinese opium* for the last three years:

1876,	.	.	.	.	46,504 lbs.	value, \$474,828 00
1877,	.	.	.	.	56,808 lbs.	" 590,911 00
1878,	.	.	.	.	66,353 lbs.	" 681,677 00

Paints in Oil—Total Imports for 1878:

Barytes,	.	.	.	45 bbls.	Paint,	.	.	.	267 csks.
"	.	.	.	125 cks.	"	.	.	.	6698 pkgs.
Lead,	.	.	.	10,851 pkgs.	"	.	.	.	2164 cs.
"	.	.	.	16 bbls.	"	.	.	.	83 drms.
"	.	.	.	6899 kegs.	Varnish,	.	.	.	2067 cs.
"	.	.	.	1674 cs.	"	.	.	.	284 pkgs.
"	.	.	.	415 csks.	"	.	.	.	584 bbls.
"	.	.	.	1 car.	"	.	.	.	23 ½ bbls.
Kalsomine,	.	.	.	50 bbls.	"	.	.	.	8 kegs.
Litharge,	.	.	.	288 kegs.	"	.	.	.	21 csks.
"	.	.	.	2 bbls.	"	.	.	.	724 pkgs.
"	.	.	.	104 pkgs.	Venetian red,	.	.	.	50 bbls.
Ochre,	.	.	.	10 bbls.	Zinc oxide,	.	.	.	2328 bbls.
Paint,	.	.	.	571 bbls.	" white,	.	.	.	400 cs.
"	.	.	.	27 ½ bbls.	" "	.	.	.	115 bbls.
"	.	.	.	897 kegs.	White, Paris,	.	.	.	896 bbls.

Imports of lead fell off considerably compared to 1877, while those of paints in general increased. Trade was good, but behind former years in consequence of but few new buildings having been erected. Lead which opened at 9 and 10 cents declined by degrees to 7 and 8 cents. White leads ranged from 9 to 7 cents, closing at the latter figure.

Paper.—Imports for the last three years were:

	1876.	1877.	1878.
Reams,	125,984	124,602	97,496
Rolls,	5,118	4,728	4,662
Cases,	4,092	4,660	5,152
California receipts, reams,	42,115	69,141	67,861

Imports of Eastern have fallen off nearly 25 per cent as compared to those of 1877. This has been partly owing to heavy stocks and competition of local mills. Quotations for staples January 1st, 1879, were:

New, 7½ and 10 cents per lb. Manilla, 7½ and 9 cents per lb. Hardware, 6 and 10 cents per lb. Straw, 50 and 90 cents per ream.

Perfumery, Pomades, Etc.—Lubin's handkerchief perfumes lead the market. These seem to be made up to the standard of this well-known house. Gobler's rates, \$8.00 per dozen, stamped. Of foreign colognes, the Farinas are held in the highest esteem, while among our French residents Pinand's is the favorite, which is sold, quarts, \$36 00, and pints, \$21.00 per dozen. The basket F. A. Farina brings the same rates.

Florida water (M. & L.) is imported and sold in large amounts, the price varying from \$5 00 to \$6.00 per dozen, according to demand. Piver's, Pinand's, and Monpelas's pomades rule the market, and bring from \$4.00 to \$12 00 per dozen, according to size and style. Some houses import English perfumery, soap, etc., from well-known London makers, but these goods meet with a limited sale.

Roots.—The following are the more frequently sold of this important class of goods: Aconite, angelica, colombo, gentian, ginseng, jalap, rhubarb, sarsaparilla, taraxacum, ginger, and valerian roots. Many of these are considered as "stars" for the various kinds of bitters, elixirs, tonics, etc., as well as in frequent use in the regular line of business.

Ginseng-root.—This panacea of the Chinese used to be worth its weight in silver. The greater part received in San Francisco comes from the States of North Carolina, Minnesota, Iowa, and Wisconsin. The imports for the past three years were:

1876,	.	.	.	.	.	.	.	.	875,000 lbs.
1877,	.	.	.	.	.	.	.	.	872,000 lbs.
1878,	.	.	.	.	.	.	.	.	865,000 lbs.

Most of which was exported to China. None but long and fine-looking roots receive attention from Chinese buyers. It is laid down here at 95 cents to \$1.15 per lb.

Jalap-root is sometimes imported from Mexico, but comes to hand so poorly cured and assorted that preference is given to that sent from New York.

Rhubarb-root occurs here under the usual variety of grades and names, as in other markets. Large quantities of Chinese root have been imported from Hong Kong. It occurs generally in cylindrical or roundish pieces, sometimes flattened and of a dirty brownish and, at times, yellowish color externally. Most of the pieces are quite heavy, having a compact, close texture, and when broken present a ragged uneven surface, streaked with white, yellow, and red, and often with darker colors. It seems to possess considerable therapeutic value when carefully selected.

Canton stick rhubarb is sometimes met with in this market. It is supposed by some to be the branches of the root of the plant which yields the better quality of Chinese rhubarb.

Roots of good quality can be had in the San Francisco market for 60 cents per pound.

Seeds.—Anise, canary, cardamom, caraway, colchicum, coriander, fennel, flax, hemp, mustard, quince, rape, and worm seeds, are the most active of this line. Preference is given to those of California production when properly sent to market, and prices vary slightly.

Salt.—Imports for the last three years were :

	1876.	1877.	1878.
English,	10,779,953 lbs.	5,608,340 lbs.	7,825,590 lbs.
Carmen Island,	2,614,508 lbs.	2,391,760 lbs.	1,784,080 lbs.
Peruvian,			2,614,080 lbs.
Receipts of California,		18,600 tons.	15,000 tons.

Imports of English for 1878 did not equal those for 1876, and were more by one-half than for 1877. The make of California decreased. The imports of English were so heavy in the first half of the year that the price fell \$2.00 on coarse, and \$7.00 on fine, the quotations being \$16 00 and \$17 00 respectively, but towards the close advanced to \$27.50 and \$30.00.

Quotations January 1st, 1879, were: Liverpool, coarse, \$25.00; fine do., \$25.00. Carmen Island, coarse, \$12 50; fine, \$18.00 and \$25.00; California, coarse, \$6 00 and \$10 00; fine \$17.00 and \$24.00.

Spices.—Imports for the last two years were :

	1877.	1878.
Cassia,	215 boxes.	180 boxes.
Cloves,	11 mats.	81 mats.
"	169 bags.	194 bags.
Miscellaneous,		7 packages.
Nutmegs,	172 boxes.	412 boxes.
Pepper,	840 barrels.	127 barrels.
"	1818 bags.	1674 bags.
"	682 boxes.	558 boxes.
"		346 packages.

Pepper kept steady during the year, till toward the close it advanced 1 and 1½ cent, owing to scarcity. Consumed during the year 980 bags. Nutmegs have sold low, from 75 to 87½ cents. Cassia did not vary much during the year.

Quotations at the commencement of 1879 were :

Cassia, 20 cents.	Mace, 72 cents.
Cinnamon, 60 and 75 "	Nutmegs, 92½ "
Cloves, 44 "	Pimento, 17½ and 18½ "

Ground, in glass :

Cassia, per doz., . . . \$1 25	Mustard, per doz., . . . \$1 20
Cloves, " 1 87½	Nutmegs, " 1 75
Ginger, " 1 00	Pepper, " 1 25
Mace, " 1 75	" " 1 50

Vanilla beans are largely dealt in by the trade ; the Mexican, best quality, meeting with most favor. It is held at \$8.00 and \$12.00 per pound. The Sandwich Island is a much larger bean, but inferior.

Wines and Spirits.—Imports for the last three years were :

Alcohol :

	1876.	1877.	1878.
Barrels,	649	8910	2853
Cases,	3699	2753	621

Imports fell off largely as compared with 1877. Prices ruled lower, varying from \$1.15 to \$1.18 during the year.

Brandy.—Imports for the last four years were :

	Gallons.	Bottles.
1875, casks and cases,	68,224	6,184
1876, "	113,821	7,192
1877, "	91,234	10,822
1878, "	61,764	7,457

Imports show a decline as compared to 1877. The market has been quiet the whole year, although there was no particular change in prices, demand being light.

Gin.—Of gin imports for the last three years were :

	1876.	1877.	1878.
Casks,	719	315	314
Barrels,	11	136	85
Half-barrels,	20	15	5
Quarter-barrels,	95	47	208
Octaves,	289	274	100
Cases,	984	1135	1420
Pipes,	2	2	2
Quarter-pipes,		20	
Eighth "		100	
Packages,		9	
Hogsheads,	8		

Consumption light for the year.

Quotations, January 1st, 1879, were : Holland, \$3.00 and \$3.25 ; Native, \$1.75 ; J. de Kuyper's Stag H., in qrs. and oct., \$3.00 and \$3.25 ; Anchor, in cs., \$17.00 for red, and \$10.00 for green ; Black Swan, Elephant, Game-cock, and Eagle H. Gin, \$3.15 and \$3.25 per gallon ; Triple flavors, Elephant, \$3.50.

Rum.—Imports for the last three years were :

	1876.	1877.	1878.
Barrels,	342	250	638
Half-barrels,			5
Casks,	5	1	27
Quarters,	186	80	22
Octaves,		10	10
Pipes,		2	
Puncheons,	8		
Cases,	1		5

Imports of N. E. rum increased largely during the year (1878).

Quotations, January 1st, 1879, were: Old Jamaica, 50 per cent. o. p., \$5.00 and \$5.25; N. E., \$1.75 and \$2.20.

Whiskey.—Importations of whiskeys have not been far from ordinary as compared to previous years. Prices have ruled higher, as well as demand. Kentucky brands are the favorites in the San Francisco market.

The following table shows the imports of whiskey for the four years ending with 1878:

	1875.	1876.	1877.	1878.
Barrels, . . .	15,943	22,436	24,136	23,169
Half-barrels, . . .	1,204	926	1,225	1,679
Casks, . . .	119	45	52	3

Prices ruled from \$2.25 to \$5.00 per gallon, for bulk, and \$4.50 to \$12.00 per dozen.

Wines.—Importations of French wines for the last four years have been as follows, in gallons:

1875.	1876.	1877.	1878.
666,000	626,000	831,000	451,000

Wines of all kinds were light during the year, though the market was higher for clarets than in 1877. The subject of the manufacture of native wines, brandies, etc., will be noticed in another part of this report.

PART II.—NATURAL PRODUCTS.

California, the first of the Pacific States, is known throughout the length and breadth of the land as the "Golden State," which name also seems to be accepted as the synonym for boundless riches! The almost fabulous sums taken from her mines, the marvellous yield of her farms, the variety and abundance of her mineral and agricultural products have made her famous throughout the world. In beauty and grandeur of scenery she is not excelled, and in variety of soil and climate not surpassed.

The State of California is over seven hundred miles in length by about two hundred in width, and embraces the same nine degrees of latitude which, on the Atlantic side of the continent, include the extensive and populous country stretching from Charleston, South Carolina, to Plymouth, Massachusetts, a region occupied by portions of ten or twelve States. Within these limits is an area of nearly *one hundred and sixty thousand square miles*,—greater than the combined area of New England, New York, and Pennsylvania, or that of Great Britain and Ireland with several minor German states added. An outline of this great State on the map resembles that of an oblong trough, the *Coast Range* of mountains on the western or ocean side, and the great *Sierra Nevada* on the east, with their interlacing extremities forming the rim, and inclosing a series of level valleys remarkable for their fertility, once basins of water, salt or fresh, now filled with the washings of uncounted years, but still subject to occasional partial floods.

The mountain walls themselves are broken into innumerable smaller valleys, level like the others, those in the Coast Range being the largest and loveliest, and only slightly elevated above the ocean, those of the Sierra Nevada, and especially at the sources of its streams, and between its crests of double summits, attaining an elevation of from *three to seven thousand feet*, and inclosing charming lakes!

Although the State reaches to the latitude of Plymouth Bay, on the north, the climate for its whole length is as mild as that of the regions near the tropics; half of the months are nearly rainless; snow and ice are almost strangers except in the high altitudes; there are fully two hundred cloudless days every year; roses bloom in the open air of the valleys through all seasons; the grape grows at an altitude of three thousand feet with Mediterranean luxuriance; the orange, the fig, and the olive flourish as in their native climes, yet there is enough variety of climate and soil to include all the products of the northern temperate zone with those of a semi-tropical character.

The great valleys of the interior yield an average of twenty to thirty-five bushels of wheat to the acre; crops of sixty bushels are not uncommon, while as high as eighty bushels have been known to be produced on virgin soil under the most favorable circumstances!

It is remarkable that with these genial characteristics blends some of the grandest mountain scenery in the world. The Sierra Nevada contains the highest peaks known in North America. In its northern portion stands *Mount Shasta*, fourteen thousand four hundred feet high, and towering seven thousand feet above all surrounding peaks. In its southern portion, however, where the main chain attains its greatest general height, Mount Whitney rises about fifteen thousand feet, and is surrounded by a close congregation of one hundred peaks which are *all* above thirteen thousand feet in height, while the embracing region for three hundred square miles has an elevation of eight thousand feet! Beside these figures the Alps become inferior. The great Yosemite Gorge has a world-wide celebrity for its granite walls, which rise perpendicularly to the height of four thousand four hundred feet, and over which tumble river currents that break into foam on the blue air or sway in the breeze like veils of lace!

In this splendid range occur those gold deposits, the most extensive ever known, and which have yielded in twenty-five years over one thousand millions of dollars, and which are still yielding over thirty-seven per cent. of the whole annual gold product of the world, or ten per cent. more than Australia! In this range, or its off-shoots, are also found mines of silver, copper, iron, and coal, with smaller quantities of numerous other metals and minerals.

Here are also the finest coniferous forests of America, including several groves of the largest and oldest trees in the world. More than all this, a large portion of the Sierra Nevada, rugged as it might seem to be from this description, is well adapted to cultivation and settlement, its lower ridges, its depressions and foot-hills having a productive soil, and being accessible by good wagon-roads, in some places by railroads already built or projected, while the mining communities furnish good markets.

Agriculture in the mountain districts is becoming a striking feature of the

industry of the State, and it is believed that for grape and fruit raising the high lands will be hereafter generally preferred. Many of these remarks are true also of the Coast Range, where mountains three thousand feet high are often clothed to their summits with a thick growth of wild oats, which furnish excellent pasture and hay ; where the valleys are rich and picturesque, and where quicksilver, salt, sulphur, borax, and splendid redwood timber are found in abundance.

Metals and Minerals.—From north to south and from east to west throughout the State minerals in endless profusion and variety abound. No limit can be given to their extent, and no single work be enough to more than chronicle their different names and peculiarities. Almost every substance known to the metallurgist, and of use in the arts and manufactures, is to be found awaiting the skill and enterprise to prepare and forward to the great markets of the world. As exploration continues new deposits or lodes are found, new discoveries made, and with the developments thereby induced new sources of wealth are opened.

Metals and their various combinations play so important a part in the drug trade that no apologies are needed for devoting attention to the more important, which even at this early date are being brought to the notice of the different trades and manufactures depending upon them for existence. In the full sense the term "*mineral*" should apply to every inorganic substance flowing from or taken from the earth, as in springs, mineral or otherwise, water flowing or still, clays of different kinds, sand or other silicious products, etc.

The mineralogy of California presents some peculiarities that are worthy of note. Of the known mineral species of the world (about seven hundred) over one hundred have been already recognized on this coast. The paucity of silicates and the absence of zeolites elsewhere, so common in the volcanic rocks, are marked features. Fluorspar and barytes, which enter so abundantly into the composition of the veinstones of other mining countries, are of exceeding rare occurrence. The similarity of our mineralogy to that of Chili, South America, has been noted and adduced as proof of the unity of the Cordilleras of North and South America.

Antimony.—This metal is rarely mined in the United States, but it can be reckoned as one of the products of this State. It is found associated with other metals, forming antimonial ores, but in one instance near Havilah, Kern County, a vein is mined for it alone. It also occurs as stibianite (native sulphide) in Humboldt County, Nevada. California ores when worked to that end produce it to considerable extent. Antimony ochre (Valentinite) is found in some localities. Antimonial ores have been treated considerably in San Francisco, and realgar or crude antimony manufactured with a view to exportation.

Arsenic.—In the collection of minerals from the Pacific Coast, sent under the care of Henry G. Hanks, Esq., of San Francisco, to the Paris Exhibition,*

* Catalogue of the minerals, ores, rocks, and fossils in the Pacific Coast exhibit of the Paris Exposition, containing a list of 1887 specimens, all duly labelled, classified, and numbered.

were samples of arsenolite. This mineral results from the natural decomposition of enargite on the "dumps" of mines being worked for the noble metals. No attention has been paid to manufacturing this ore. Arsenic is found in Monterey County, California, and as arsenical antimony in the Ophir Mine, Virginia City, Nevada. It occurs in California as mispickel (arsenical pyrites), and largely associated with partsite, a variety of stibianite.

Asbestos.—Found freely in serpentine rocks, and occurs in nearly every county in the State, particularly in Del Norte County and all along the west side of the Sierras. Fibrous asbestos occurs as a variety of amphibole. Various samples are brought into San Francisco from time to time, of the variety called crysotile. Asbestos, properly disintegrated and prepared for the purpose, is used for packing of boilers, steam-pipes, steam-chests, etc. It is also applied to many uses in chemical laboratories. Some quantities are mined and sent to New York.

Barium.—Native sulphate of baryta occurs in Inyo and Shasta counties, Cal., and on both sides of the Colorado River, mostly in vein matter of silver ores. In appearance it is dense, of a translucent white, crystalline in plates or laminæ. Abundant, but not utilized to any extent.

Borax.—The discovery of boracic acid and the natural borates on the Pacific Coast was made in January, 1856, by Dr. John A. Veatch, in Tehama County, Cal. His discovery caused an examination of the waters of the various mineral springs then known, and boracic acid was found in nearly all. In September of the same year Dr. Veatch discovered Borax Lake. This is situated in Lake County, Cal., 2 miles south of Clear Lake, and 110 miles north of San Francisco. Borax crystals, in large quantities, were found in the mud bottom of the lake, and also in the water from which it was obtained by evaporation.

Borax Lake produced before the discovery of the gigantic deposits in South-eastern California and Nevada considerable quantities of refined borax. In the year 1865 the yield was 240 tons; in 1866 the daily average yield was 2½ tons. On the partial exhaustion of the bed, and an unusual rise occurring in the lake in 1868, the mine was abandoned.

Boracic acid, free or uncombined, is of common occurrence on the Pacific Coast. It has been found in the waters of the Pacific Ocean. Common salt, made by evaporating the sea-water, contains appreciable amounts of boracic acid. It has been found in the waters of Mono and Oweri lakes. Doubtless an examination of the bottoms of these lakes would develop crystals of borax in the mud as at Borax Lake.

Very extensive deposits of borax have been found near these lakes. This remarkable saline deposit lies in the State of Nevada, distance from Mono Lake, 46 miles to the northeast. It has evidently been at one time an alkaline lake, as Mono Lake is now. This and similar deposits consist of salt, sulphate of soda, borate of lime, and borax.

The borate of lime, *ulexite*, is found in rounded concretions, from the size of peas up to three or four inches in diameter. Large quantities of borate of lime were shipped to San Francisco, but it was found that the expense of transportation was greater than the selling rates!

It was soon discovered that the alkaline deposit in which the *ulexite* occurred

would yield borax, if dissolved and crystallized. Extensive fields of alkali containing borax in varying quantities are known to exist in the southern part of Nevada. It also occurs in Oregon as cryptomorphite (a form of borate of lime), and in San Bernardino County, Cal., as tincal, or native borax. It is being worked to some considerable extent with profit, as the process of manufacture is more simple than in the case of the Nevada and other deposits above noted. It also occurs plentifully in that locality associated with the nardite (native anhydrous sulphate of soda) and common salt.

Bromine.—Bromine occurs in the sea-water of the Pacific Ocean, and in the waters of most of the mineral springs. Immense quantities of kelp are thrown up by the sea on the long sandy beaches of the coast, particularly in the southern shore line. This substance, properly treated, would furnish large quantities of bromine, but at present is entirely neglected.

Coal.—The geological features of California have been regarded as unfavorable for coal, but nevertheless that valuable mineral, or its relative lignite, is found in many localities, and is successfully mined. In the Mount Diablo Range, which is situated chiefly in Contra Costa County, Cal., coal has been mined for the last eighteen years, and something like 160,000 tons are produced annually! Coal here occurs in a cretaceous formation, covering an area of about twenty square miles, which is surrounded and overlaid by unaltered cretaceous strata, upon which rest conformably the miocene and pliocene divisions of tertiary, the eocene being apparently wanting. The coal is of fair quality, and is much used by river and bay steamers, as well as sold largely in San Francisco and surrounding cities. In Butte, Placer, Amador, and San Joaquin counties are deep beds of coal or lignite, which are used to considerable extent by miners located in the vicinity of the beds, making an excellent fuel, burning up rapidly, and leaving no slate or klinker. The number of tons of coal raised on the Pacific Coast for the last nineteen years is given below :

	Tons.		Tons.
1860,	8,681	1870,	145,907
1861,	19,384	1871,	185,685
1862,	37,462	1872,	214,678
1863,	53,550	1873,	244,584
1864,	48,494	1874,	279,589
1865,	74,425	1875,	244,498
1866,	97,252	1876,	256,845
1867,	123,840	1877,	239,667
1868,	158,229	1878,	271,801
1869,	184,032		

Copper —In a country where the precious metals abound the useful and less valuable metals are often overlooked by the mining interest. This has been the case with copper in California. Copper is very abundant, not only in its native state, but also as red oxide, black oxide, sulphide, and double sulphide of iron and copper (calcopyrite), and purple copper. The most important copper-producing locality in California is in Calaveras County; the mines at Copperopolis were for a time extensively worked. The yield of the Union

Mine from 1861, when opened, to July 15th, 1877, was 108,731.678 pounds, all of which was exported to the Atlantic States and Europe. The receipts from sales of ores produced by the Keystone Mine were \$375,000. Copper mines of undoubted value exist in Amador, Mariposa, San Luis Obispo, Los Angeles, Plumas, Del Norte, Contra Costa, Nevada, and Inyo counties.

Attention has lately been called to the importance of copper mines producing large quantities of low-grade ores. The San Francisco Copper Mine at Spenceville, Nevada County, California, is an example. This mine is very extensive, the ore being cupriforous pyrites, very free from gangue. The average metallic copper in the ore is 64 per cent. The mine is worked with profit. The sulphur present in the ores supplies fuel in the roasting, which is done on a large scale in heaps. The resulting product is leached with water, and the soluble copper precipitated by metallic iron.

In 1863 a copper mining excitement prevailed, and in different sections of the State veins of mineral containing copper were found, and partial developments made, but as the excitement abated mining, to a great extent, ceased.

Diatomaceous Earth.—The diatomaceæ or brittle-worts are an order of plants, alliance *algales*. They are crystalline, angular, fragmentary bodies, brittle, and multiplying by spontaneous separation. This group of *algæ*, of low organization, and including the *bacillariæ*, is remarkable for the large quantity of *silex* which they contain. Vast beds occur, many feet in thickness, in some parts of the world, consisting entirely of effete *frustules*, as the separate joints of the fronds are styled. Some of these beds are more or less colored, and are known by the name of *tripoli*, used, to a large extent, for polishing the surfaces of metals, etc.

The first known of these deposits on the Pacific Coast were extensive leads near Wadsworth, in Nevada, the white lumps of which were in general use among the miners, and known as "Washoe Chalk;" this was remarkable for its snowy whiteness, high specific gravity, and silky feel to the touch.

Chemical and microscopic investigation proved this to be "diatomaceous earth," and analysis showed a large percentage of *silex*, in some instances as high as 95 per cent. Leads occur in various parts of California, and this mis-called "mineral" will yet be an important article of commerce. It can be used in the manufacture of glass, porcelain, and pottery, fire-brick, tiles, drain-pipes, etc., and is used to a great extent as a diluent for nitroglycerin, forming with this dangerous explosive cartridges, easily handled, and transported with comparative safety, called "Giant Powder," which is much used in the mines of California.

Gold.—California owes her present greatness to the accidental discovery of gold at Sutter's Mill, near Coloma, in 1848. The presence of the precious metal in California had been suspected, if not actually known, for many years. Placer gold in moderate quantities had been found at a still earlier period, but the discovery of rich placers by Marshall may be regarded as the turning-point in the history of the Pacific States, if not of the United States.

The auriferous belt is known to extend through the entire length of the State, and at both extremes is mined extensively and successfully. The ma-

jestic range of mountains known as the Sierra Nevada rises through the peninsula of Lower California, and extends northward into Oregon, turning westward towards the coast as it is about leaving California. Throughout this range, with the exception of slight intervals, gold is found.

It is difficult to localize it or define its extent. In veins and placers, in slate and porphyritic seams, in deep gravel-beds and under the lava of dead volcanoes, in river channels and bars, in the alluvium of the surface and on the deep bed-rocks of the ancient drifts *gold* is found—in lumps and nuggets, in flaky brilliant scales, and in infinitesimal dust.

It is found in rocks later than the Paleozoic, but more particularly in the metamorphic belt of Triassic and Jurassic rocks on the western flank of the Sierra Nevada. Nests and bunches of *octahedra*, with beautifully brilliant faces, have been found, and one instance is known of a mass made up of irregular dendritic crystallizations weighing 16 pounds having been taken from the ground. Crystalline gold has been found in many of the hydraulic washings in the State.

Gold mining in California may be divided as follows: I. Placer mining. II. Hydraulic mining. III. Working of mineral veins.

I. *Placer Mining*.—When gold was first discovered it was sought only in the beds of rivers, on the bars and shoals formed by the currents and eddies of the swift mountain streams. The first appliances were rude and imperfect. Quantities were obtained by washing pansful of the rich earth, and by seeking “crevices” in the bed-rock, the earth of which was found to be uncommonly rich in the deposit of the precious metal.

Gradually the bars were worked out, and the gold was sought in the alluvial deposits and on the borders of rivers. As the deposits contained less gold than those first discovered in the beds of streams, labor-saving machinery was required, that larger quantities might be subjected to the washing process. This want led to the introduction of the “cradle,” “long-tom,” and the “sluice,” with its improvements, such as “block-riffles,” “zig-zags,” “under-currents,” etc.

When these deposits failed, or were found less profitable, the next process for collecting placer gold was naturally found to be

II. *Hydraulic Mining*.—Hydraulic washing constitutes a novel and interesting system of mining. The deep gravel deposits, having fine particles of gold disseminated through the mass, require rapid removal to extract the gold with profit. For this the “hydraulic” has come into use. Large capital, bold enterprise, and good judgment are required, but with these success is assured. The gravel ridges vary in depth from 50 to 500 feet, and if containing gold to the value of ten cents per cubic yard, and favorable for washing, are mined profitably. To wash them, sluices from 4 to 8 feet in width, and sometimes extending a mile or more in length, are placed, reaching from the lowest bed of the gravel down some adjacent “cañon” (valley or ravine). With an iron pipe, from a foot to 20 inches in diameter, a column of water under great pressure is directed to the base of the gravel, against which it hurls itself like a liquid catapult, and the bank melts before it, and flows through the sluices,

where a part of the golden particles settle and remain. Nozzles, distributors, riffles, undercurrents, quicksilver, etc., are required to complete the process.

III. *Working of Mineral Veins.*—The most lasting of the mineral resources of California is conceded to be the quartz veins. From these it cannot be doubted came the gold which enriched the placers with a wealth never before known. The gold-bearing veins are found throughout the western slope of the Sierra Nevada and in the mountains of the Northwest Coast. The number it would be difficult to estimate, and new discoveries are continually adding to the list. Comparatively few of the many thousands known are developed, and the majority of those worked upon are so indifferently managed that their great value is scarcely known.

It has been the misfortune of the State that the most daring of the mining enterprises have been undertaken by men limited in both means and experience. In some instances they have risen with the occasion, and by skill and energy developed properties of extraordinary value. Small and incomplete mills, with rude methods of saving the gold, incurring expense and loss, have generally been established to aid in the development of a mine, and unless the quartz was exceedingly rich failure was the natural consequence. A better understanding of the subject is now beginning to prevail; greater confidence is felt in mining interests than formerly; men of wealth and business capacity are turning their attention to it, and we may say a new era in quartz mining appears to be opening in California.

The gold-bearing veins are in countless numbers, and are found from the extreme southern border of the State to its northern line, and in the Sierra Nevada from its base to its summit. The gold is contained in the rock in various proportions, from a few dollars to several hundred per ton. The rapid mountain streams furnish abundant water-power, or the plentiful forests supply fuel for steam purposes, thus giving convenient aid for propelling the necessary machinery. There are no satisfactory statistics of the amount of gold produced in California since 1848, but it is estimated by the best authorities to be considerably upwards of \$1,500,000,000 dollars! The largest amount reported mined in any one year was in 1853, when upwards of \$60,000,000 were exported, and it was believed that nearly 50 per cent. more was mined and retained in use, or carried out of the country by private means.

At that time the great gold excitement, which had stirred the world, was at its culminating point; the mountains were alive with men, the precious dust was easily obtained, the river-beds and bars were yielding their riches, abundant rains gave the "dry diggings" the needed water, and work was conducted with great energy.

The discovery of the silver mines of Nevada drew away men and capital and the gold product declined to about \$20,000,000 in 1870. Latterly, the transportation of bullion having concentrated almost entirely in the express of Wells, Fargo & Co., a reliable source of statistical information is established.

The estimated production of gold since the year 1848 for the Pacific States may be seen in the following table. This includes the total yield of the States of California, Nevada, Oregon, Washington Territory, Idaho, Montana, Utah, Arizona, Colorado, and Dakota, of which California has produced at least three-

quarters of the entire amount, although of late years the ratio has decreased, owing to the development of mines in the other States.

The figures taken from reports and estimates of Wells, Fargo & Co. are known to be considerably inside of the truth, as the deposits in the United States mint in this city alone considerably exceed the amount reported to have been collected and forwarded in any one year.

In the year 1878 there were asserted, from the same source, to have been produced from the Pacific States :

Gold, in value to,	\$37,576,080
Silver, "	37,248,137
Lead, "	8,452,000

Table of the Estimated Production of Gold on the Pacific Coast since 1848.

1848,	\$5,000,000	Brought forward,	\$852,000,000
1849,	23,000,000	1864,	55,967,605
1850,	59,000,000	1865,	57,496,800
1851,	60,000,000	1866,	62,000,000
1852,	59,000,000	1867,	59,000,000
1853,	68,000,000	1868,	51,000,000
1854,	64,000,000	1869,	47,000,000
1855,	58,000,000	1870,	48,000,000
1856,	63,000,000	1871,	42,857,000
1857,	64,000,000	1872,	42,688,108
1858,	59,000,000	1873,	41,500,000
1859,	59,000,000	1874,	49,150,000
1860,	52,000,000	1875,	50,750,000
1861,	50,000,000	1876,	53,100,000
1862,	52,000,000	1877,	50,700,000
1863,	57,000,000	1878,	46,870,000
	<hr/>		<hr/>
	\$852,000,000	Total,	\$1,609,079,508

Graphite.—Graphite occurs to a limited extent in California. It is found always with earthy admixture, and consequently of no commercial value, and is not mined. Future explorations may result in finding valuable beds of this useful mineral.

Iodine.—This substance occurs in the kelps which are thrown upon the beaches of the coast, and also associated with bromine in the sea-water and waters of the mineral springs. It is also found in conjunction with silver, forming the ore known as iodinite in some of the southern counties.

Iron —Although there are no blast-furnaces nor iron mines in development in California, there is an abundance of iron ore of a high percentage, which seems capable of supplying the great demand of the State. A company was formed several years since to work an iron mine in Sierra County, where a large body of ore exists contiguous to limestone, and in the midst of a densely wooded region. Charcoal could be had in unlimited quantities at low rates for smelting, limestone flux was at hand, and all the conveniences requisite

for carrying on the business appeared to be supplied, but the enterprise is still in abeyance.

Iron occurs in many forms in California, chiefly as magnetite (in volcanic rocks), and in the well-known "iron-sand" as hematite, limonite, yellow ochre (native hydrated sesquioxide of iron), and vast quantities of *iron pyrites* are successfully mined for the sulphur and gold contained therein.

An extensive bed or stratum of iron ore, showing over 64 per cent. of fine metal, is found near Clipper Gap, in Placer County, on the Central Pacific Railroad. A company was once organized to work this mine, and developments made, but, for some reason, it came to a stand.

Beds of like character are found in nearly every county in the State; one in Butte County, at Chapparal Hill, has been partly investigated, showing an average of 65 per cent. of metal.

Chrome iron is found in large quantities in various parts of the State, and is mined with success. This, though an iron ore, is used as a pigment in forming colors and paints, and in the coloring of glass. It is found in the foothills of the Sierra Nevada, in Amador, Placer, Tuolumne, Yuba, and other counties, and in the Coast Range of mountains. Near Clovedale, Sonoma County, a large vein or bed of this ore is found, twenty tons per day being taken from it and exported to England.

Lead.—This "ignoble" but useful metal occurs as galena (crystalline sulphide), anglesite, and cerusite, in most of the auriferous quartz veins of California; also at various points in the Coast Ranges. Lead occurs also in plentiful combination with silver, the principal mines for which are in Cerro Gordo District, Tuvo County.

The product of these mines is enormous, and the working is very profitable. The veins are from ten to forty feet in width, the ore being argentiferous and auriferous galena and carbonate of lead, carrying from 25 to 90 ounces of silver to the ton, and 30 to 50 per cent. of lead. Above 30,000 pounds of bullion per day are produced, the value of the annual product being over \$2,000,000.

The product of lead and base bullion is, therefore, an important interest. By base bullion is meant crude lead, in which the silver and gold contained in the ores from which it is smelted still remain. It must be refined before it becomes an article of general commerce. Part of this work is done in extensive metallurgic works in San Francisco and Contra Costa, while large quantities are sent abroad for treatment.

It is impossible to get statistics of the annual product of California in lead, as all produced on the coast is sent to San Francisco to be either refined or exported. The gross product of lead for the Pacific States for the past five years has been in value as follows :

1874, the production amounted to	.	.	.	.	\$3,800,000
1875, " " "	.	.	.	.	5,100,000
1876, " " "	.	.	.	.	5,040,000
1877, " " "	.	.	.	.	5,085,020
1878, " " "	.	.	.	.	8,452,000

The lead product of California, Utah, and Nevada exceeds that of the remainder of the United States and Territories combined. The product of lead

for the Pacific States amounts in value to 5 per cent. of the gross amount recovered from the earth of gold, silver, and lead.

Limestone.—This useful mineral is abundant in every section of the State, and is cheaply obtained in unlimited quantity. Gypsum occurs in many places. Much of the lime used in the State is produced from the chips resulting from quarrying, and such pieces as are unfit for dressing of marble, considerable amounts of which are found in the State. The source of supply for lime is El Dorado, Santa Cruz, and Solano counties. It also occurs largely as anhydrous sulphate, valueless save as a building-stone.

Magnesium.—Abundant in California. Is found as dolomite (native magnesium limestone) and magnesite (native carbonate). Among other uses it is applied to the manufacture of chloride magnesium, one of the principal ingredients of artificial stone.

Manganese.—Manganese is quite abundant. It occurs as pyrolusite, psilomelane, and rhodonite, diallogite (native carbonate) in nearly every county. Pyrolusite (native binoxide) is used in manufacturing chlorine gas, and in the manufacture of oxygen. Considerable quantities of the latter ore are shipped to Europe for making chloride of lime. It is also used freely in the chlorination process for saving gold occurring in pyritic ores. The ore is roasted, thereby setting the gold free from its intimate association with the iron sulphide; the ore is then thoroughly wetted with water, then exposed to the influence of chlorine, which, attacking the gold, forms a soluble chloride, which is dissolved out upon leaching the ore. Gold is then precipitated in a metallic state by treatment with iron protosulphate.

Marble.—As the miners delve in the rocks of the mountains in their persistent search for whatever treasure is hidden in their close embrace many brilliant discoveries are made, and new and pleasing resources developed. The lofty Sierra and parallel Coast Range, great chains of granite and slate, are seamed and permeated with many strata of rich and beautiful rocks, some of the metalliferous veins, and others of various characters and uses. Of the many valuable rocks disclosed marble is not the least in importance. The most noted quarries of marble are at Columbia, Tuolumne County; Indian Diggings, El Dorado County; and near Suisun, in Solano County. California marble is generally clouded in white and gray, and in Placer and Butte counties are beds of black-streaked and other colors. Suisun marble is of various shades of brown and yellow.

Mercury.—Contemporaneous with the development of the gold mines of California came the discovery of the quicksilver of New Almaden. This liquid metal is almost indispensable in the mining of gold and silver, and it is a most happy condition of circumstances that the two metals should exist in the same country, and in such quantities. Seldom has there been found in the world such a grand deposit of cinnabar as existed at New Almaden, which for more than twenty years supplied the gold mines of California and the silver mines of Nevada with quicksilver, besides furnishing large quantities for export.

Until ten years since the New Almaden mine was the principal source of

quicksilver production in California. In 1850 the real work commenced, no less than 20,000 flasks having been run out that and the following year. 1855 gave 31,860 flasks, falling four years later to 10,588. In 1860 and 1861 the mine produced nothing, having been closed by injunction. In 1862 84,765 flasks were made, in 1868 40,891, and in 1865 47,194, after which the yield gradually declined till 1874 gave only 9,084 flasks.

The ore from this mine yielded at first 8½ per cent. of metal, but declined gradually till the low grade ores being worked in 1874 the percentage fell to 2.96. The consumption on this coast absorbs one-third of the product, the balance being exported or stored.

The area of production has lately become so enlarged as to require a passing glance at the more important cinnabar localities lately discovered. Beginning at the most northerly point in the State, Trinity County first claims our attention. The most noted mine, and a typical one of its class, is the Altoona Mine, situated twenty miles from Trinity Centre, in the county of Trinity. The ore occurs in a regular contact vein lying between serpentine and sandstone. It varies from 5 to 20 feet in width, the matrix being a decomposed sandstone. As the whole of this mass consists of workable ore carrying from 5 to 12 per cent. of metal, this is one of the richest leads of cinnabar in the State. The mine is now producing about 500 flasks per month.

Coming south the next quicksilver-producing locality met with lies in the Coast Range, in Colusa County. Several mines, only moderately worked, turned out last year an aggregate of 1000 flasks per month. In Napa, Sonoma, and Lake counties a great cinnabar region has been opened, though the prospects, at first bright, have been somewhat obscured by overproduction, and consequent decline in price. The Knoxville (Redington) Mine is the largest producer in that section, and turns out, when worked with full capacity, about 1000 flasks per month.

Next comes the Sulphur Bank Mine, in Lake County, on the southern borders of Clear Lake. The ore of this mine, a surface ore easily worked, is a combination of sulphur and sulphide of mercury, with some free mercury easily detected by the eye. In treating this ore it is first heated in iron cylinders with superheated steam at a temperature not sufficiently high to decompose the cinnabar, but to melt the free sulphur, which collects at the bottom, and is allowed to run out while melted, and cast in moulds. The ore is then retorted in the usual way with quicklime, and the metal allowed to run into "basins," from whence it is put into flasks of the usual capacity, 76½ pounds.

Other mines in this section, though not widely known, are assisting in a regular production of quicksilver to an extent to aid in keeping down the price of this article to a barely paying price, besides guaranteeing in a passive way against a return to the "corner" remembered to have transpired some years since, when the outcome was limited to a few mines, and foreign capital conspired with local greed to run prices up to an enormous figure.

Besides the New Almaden Mine above noted, in the same section are the New Idria, the Guadalupe, and the Henriquita mines, all contributing to fill the measure of regular supply. In San Luis Obispo County discoveries of cinnabar leads have been made, and several paying mines opened and worked.

The total production of quicksilver in California since 1850 has been as follows :

1850,	25,424 flasks	1865,	58,000 flasks
1851,	24,000 "	1866,	46,550 "
1852,	20,000 "	1867,	37,000 "
1853,	19,000 "	1868,	37,000 "
1854,	27,000 "	1869,	33,713 "
1855,	33,000 "	1870,	29,546 "
1856,	30,000 "	1871,	31,881 "
1857,	28,000 "	1872,	30,806 "
1858,	31,000 "	1873,	28,600 "
1859,	12,000 "	1874,	34,254 "
1860,	10,000 "	1875,	53,706 "
1861,	35,000 "	1876,	75,000 "
1862,	42,000 "	1877,	60,368 "
1863,	40,531 "	1878,	65,235 "
1864,	47,489 "		

In 1878 the production was divided up as follows :

The New Almaden Mine,	15,249 flasks.
" Knoxville Mine,	6,591 "
" Sulphur Banks Mine,	8,778 "
" Gaudaioupe Mine,	9,347 "
" New Idria Mine,	5,138 "
" Great Western Mine,	5,174 "
" St. John's Mine,	729 "
" Oceanic Mine,	1,692 "
" California Mine,	1,547 "
" Oakland Mine,	1,761 "
" Napa Mine,	3,050 "
" Phoenix Mine,	679 "
Other sources,	5,500 "
Total,	<u>65,235</u>

The average prices of quicksilver for several years have been as follows :

1858,	49 cents per lb.	1869,	40½ cents per lb.
1860,	40 " "	1870,	41½ " "
1861,	42 " "	1871,	99 " "
1862,	42½ " "	1872,	80 " "
1863,	50 " "	1873,	98 " "
1864,	58½ " "	1874,	\$1.87½ " "
1865,	55 " "	1875,	85 " "
1866,	47 " "	1876,	53½ " "
1867,	45½ " "	1877,	47 " "
1868,	40½ " "	1878,	42½ " "

Petroleum —The early navigators exploring the coasts of California noticed the heavy flow of bitumen into the Santa Barbara Channel, covering the water for a great distance with a thin film of oil. The same phenomenon continues, and the sailors of to-day are as much astonished at the glimmering iridescences of the surface of the water as were those of Vancouver or Belcher half a century ago.

Flowing springs of this substance are common throughout the counties of Monterey, San Luis Obispo, Santa Barbara, Ventura, and Los Angeles, and it is also found in the Tulare Valley, also in Colusa County, and near the coast in Humboldt County. From the earliest settlement of the country by the Spaniards the "brea" has been used for roofing houses, as tar for the axles of their rude wagons, for filling the seams of boats and vessels, for burning, and every purpose for which their limited wants found it applicable. This, when dried and hardened by exposure to the sun and weather, forms asphaltum, of which beds covering hundreds of acres are seen in many localities. The asphaltum is mined or dug out, and large quantities find a market at about \$20 a ton in San Francisco and other cities, where it is used in making sidewalks, covering roofs, laying pavements, cementing walls, to prevent the leakage of water, and other purposes. It is quarried similar to rock, the beds being sometimes 80 to 40 feet in depth, and is also found in large blocks on the seashore.

Petroleum in flowing wells is found, and 80 miles to the south of Los Angeles borings have been made and oil obtained. Refineries have also been established and large quantities of oil produced, but as yet none has been prepared equal to the illuminating oils of the Eastern States, some asserting, however, that for the California oils the proper *burners* are not yet invented, as with the greatest care the smoke is not consumed! A good lubricating oil is produced, and if a perfect method of utilizing it for burning were discovered *unlimited* quantities could be obtained.

Phosphorus.—Ores containing phosphorus are not plentiful. Vivianite (native phosphate of iron) is sometimes met with. No similar deposits of phosphates as are met with East are yet found in this State.

Platinum.—This metal is rather abundant in the northern counties of California, and is found notably in the beach sands from Cape Blanc to Cape Mendocino, with gold, platiniridium, zircon, diamonds, and other minerals.

Salt.—An extensive salt deposit, covering a mile and a quarter square and a foot in depth, a very pure article, is found near the Panamint Mines in Inyo County, and a similar one exists near Cerro Gordo in the same county. Numerous salt beds and springs are found in various parts of the State. The great Colorado desert was evidently once submerged, and now in the greatest depressions are thick beds of crystalline salt of unknown extent!

Silver.—The mines of California are not confined to the western slope of the Sierra Range, nor is gold the only valuable metal which miners seek. Crossing the mountain range the metal changes from gold to silver. Eastward in Nevada the silver is generally pure or mixed with gold; but the most prominent silver mines in California yield argentiferous galena, as do also many in Nevada. Such ores are treated by smelting in furnaces, while finer ores are reduced by stamps and amalgamation. The product is a rich lead called

"bullion," bearing from \$200 to \$600 of silver to the ton. The melted matter is run from the furnaces into moulds, forming bars of about 100 pounds each, in which shape it is sent to the refineries of San Francisco, to the East, or Europe, where the two metals (silver and lead) are parted.

Inyo, Mono, Alpine, Tulare, and Humboldt counties are particularly noted for rich silver leads.

The following is an estimate of the amount of silver produced on the Pacific Coast since 1860 :

1860,	\$90,897	Forward,	\$118,892,187
1861,	2,275,256	1870,	18,000,000
1862,	6,247,014	1871,	24,246,000
1863,	12,486,238	1872,	27,548,811
1864,	16,797,857	1873,	88,500,000
1865,	16,184,877	1874,	40,250,000
1866,	16,000,000	1875,	46,500,000
1867,	16,000,000	1876,	48,000,000
1868,	16,000,000	1877,	47,300,000
1869,	16,000,000	1878,	42,945,000
Forward,	\$118,892,137	Total,	\$451,371,678

The amount of silver produced in California alone for the last four years has been :

1875,	\$1,200,000	1877,	\$1,750,000
1876,	1,500,000	1878,	2,400,000

Sulphur.—This is a very common substance in California, not only entering into the composition of most ores, but beds of it nearly pure occurring in different localities. On the southern shore of Clear Lake, in Lake County, California, is an immense deposit of sulphur. This bank, covering an area of about 40,000 square yards, is composed of sulphur that appears to have been concreted into a solid mass. In purifying this article it has been found to be more or less impregnated with mercury, a defect, however, that was easily overcome. On being worked it is found to yield nearly 80 per cent. of pure sulphur. Great quantities of this useful mineral are to be found in Lake and Tehama counties, whilst deposits in Colusa County are so vast as almost to stagger belief! Many mineral waters in the State contain sulphur, and it enters largely into the composition of pyrites (native sulphide of iron containing gold).

Tin —Tin ore (cassiterite) is found in the Temescal Mountains, San Bernardino County, California. This ore assays from 85 to 60 per cent. of tin.

Zinc —This metal occurs in silver ores as sulphide in various localities in the southern part of the State.

VEGETABLE PRODUCTS.

The Flora of California.—Between the years 1792 and 1865 no less than eighty botanists pursued their labors in California, collecting and classifying, during that period, about 1800 species, a small proportion of the whole.

The early Spanish settlers of California soon became acquainted with the virtues of various plants indigenous to the country, and which, springing up profusely on the plains and in the valleys, fringing the rivers and water-courses, or thickly clothing the hills and mountain-sides, diversified the landscape, and offered a pleasing spectacle to the eye.

The flora of California presents to those accustomed to the vegetation of other lands and climes many original and striking features; the trees, shrubs, plants, flowers, and even the mosses, ferns, etc., while bearing a general resemblance to corresponding orders and genera elsewhere, are here marked by strong individual peculiarities, and in many instances the flora exhibits examples wholly original, as in the case of the "Big Trees" (*Sequoia gigantea*), which with some other like remarkable trees occur nowhere out of this State.

The newcomer from other lands is immediately struck with this difference. The mountains of California are covered with forests of pine, cedar, and fir, exhibiting a great preponderance of conifers over dicotyledonous trees, these conifers being restricted, for the most part, to the seacoast and mountain-sides.

Our streams are bordered with various deciduous trees and shrubs, while in the vast plains and prairie country of the valleys the prevailing plants are *gramineæ*, *compositæ*, *leguminosæ*, with a greater number of *liliaceæ* than in any part of the Eastern States.

This proportion seems to hold good until the foothills of the Sierra Nevada are reached, where a greater variety of species as well as genera and classes are met with. Here the *gramineæ* diminish in number, and the *coniferæ* and *compositæ* greatly increase. Here also the *ranunculaceæ* and *geraniaceæ*, with numerous variously colored and brilliant *labiatæ* occur; some of the mountain meadows, by the great variety of their flowering plants, outvying in this respect the carefully cultivated gardens of the East.

Highland or lowland, on the wide and fertile river bottoms, or in the almost impenetrable cañons or valleys of the mountain-sides, many new and strange shrubs and wild plants diversify the landscape, and attract the eye. Some present a succession of brilliant-colored blossoms, perfuming the air in spring with rich oppressive odors; others charming by the deep green of their perennial foliage; while others, later in the season, rejoice in a multitude of lively colored berries.

The rapid growth of California vegetation is remarkable. The explorer is surprised to note after a short absence, on revisiting a locality, that not only most kinds of flowering plants during the time, say of a few weeks, have ripened their seeds, but that many new plants have made their appearance. Luxuriance and rapidity of growth similar to tropical regions are noticeable in a marked degree in the floral productions of California, and the same rule

holds good in the growth of all, from the pine and redwood species to the cereals, the grasses, ferns, and the humblest weed of the garden.

Not having time or space to devote more than a passing glance at the features of California vegetation, I will divide this part of the report into the subjects of: I. Forest trees; II. The grasses of California; III. Shrubs and plants; culling from the mass of information, so vast as to be bewildering, only what seems to me to be the more important and interesting to the medical and pharmaceutical world.

Forest Trees—Of forest trees growing in California, we have distributed among the following genera:

Abies,	5	Oreodaphne,	1
Æsculus,	1	Picea,	3
Arbutus,	1	Pinus,	8
Acer,	2	Plantanus,	1
Alnus,	1	Populus,	3
Castanea,	1	Salix,	5
Cornus,	1	Sequoia,	2
Cupressus,	2	Quercus,	5
Fraxinus,	2	Taxus,	1
Larix,	1	Thuya,	1
Libocedrus,	1	Torreya,	1

In California the forest growth ceases almost entirely at from 10,000 to 11,000 feet altitude. The following brief synopsis will serve to show some of the peculiarities and utilities of the more important of the native trees, as well as some few naturalized.

Acacias.—Australian forest trees propagated from the seed, with perhaps a few exceptions, thrive remarkably in California; the climate and soil appear to be nearly or quite as favorable to the growth of these exotics as of the native forest forms.

In many of the principal towns in the State, especially in and around San Francisco, in the neighboring city of Oakland, and adjoining towns on the easterly side of San Francisco Bay, fine specimens of many of the Australian forest trees are numerous. The most popular of these belong to the genera *Acacia* and *Eucalyptus*, and have been planted for ornamental and shade purposes mostly; the light, feathery, fernlike foliage of some of the *Acacias*, their gracefulness, beauty, and color, combined with rapid growth, present so many advantages as to fairly entitle them to popular esteem.

A. decurrens, popularly known as the "Black Wattle," or "Silver Wattle," can be used for staves, but its chief use would be to afford shelter in treeless localities, and for raising forests. Its bark is rich in tannin, and its gum is not dissimilar to "gum arabic."

This species, and the *A. lopantha*, are especially recommended for their ability to resist drought, and therefore particularly applicable to treeless and sterile areas in the southern part of California, where the temperature does not decline below 10 degrees.

A. homalophylla has a dark-brown wood, is much sought for turners' work on account of its solidity and fragrance, and is also used to some extent in the manufacture of tobacco pipes.

A. melanoxyton is valuable for furniture, carriages, boats, and numerous other purposes. The fine-grained wood is cut into veneer. It takes a fine polish, and is considered equal to the best walnut. Under favorable circumstances it attains a height of 80 feet, with a stem of several feet in diameter.

The peculiar yellow displayed in the China silks and other articles is obtained from the yellow flowers of a species of acacia, and is of an exceedingly permanent character.

Alder—Alnus Oregona.—The alder on the Pacific Coast assumes the height and character of a tree, being upright, handsome, sometimes from two to four feet in diameter, and from 40 to 80 feet high. It is distributed through the middle and northern parts of California, fringing the banks of streams. The bark contains tannin in large proportions, and is considered tonic and astringent.

Buckeye of California—Horse-chestnut—Æsculus Californica.—Abundant in the Sacramento, San Joaquin, and Coast valleys. A low spreading tree; grows about rocky ledges, in ravines, and on the banks of streams. It seldom exceeds 15 or 18 feet in height; has a hemispherical shape, very dense foliage, rising from the ground in a globular form; five leaves grow together on one petiole. This tree bears heavy clusters of fragrant white blossoms from early spring until late in the summer. The bark is used in domestic medicine in fevers, and has tonic and astringent properties.

Cedars.—The cedars of California are the *Libocedrus decurrens*, and the *Cupressus fragrans*, *C. lausoniana*, and *C. macrocarpa*.

The California "White Cedar" (*L. decurrens*) is a noble and hardy ever-green, thriving in sandy soils, growing from 40 to 140 feet high, and from 5 to 7 feet in diameter. The generic name signifies "incense cedar," on account of the fragrant odor it emits when burned.

Cupressus Macrocarpus—Monterey Cypress.—This tree occurs from 40 to 60 feet in height, and 9 to 10 feet in circumference of trunk. Thick-growing and umbrageous. The wood of the cedars gives a clear lumber, useful for furniture and finishing work, and has a strong, lasting, and not unpleasant odor.

Eucalyptus.—Of the Eucalypti, *E. globulus* is very common in California, and easily cultivated; it is the Blue Gum of Victoria and Tasmania. This tree is of extremely rapid growth, and attains, in its native forests, a height of 400 feet, furnishing a first-class wood; ship-builders get keels of this timber 120 feet long; besides this, they use it extensively for planking, and many other parts of the ship, and it is considered to be superior in some respects to the American Rock Elm. Blue gum wood, besides for ship-building, is very extensively used by carpenters for all kinds of outdoor work, also for fence rails, railway sleepers,—lasting about 9 years,—for shafts and spokes of drays, etc.

Of the rapid growth of this species of Eucalyptus, and the facility with

which it is propagated, most people in California are familiar. It is not uncommon for young trees to acquire an altitude of 15 feet in one year or less, and the development of the lateral branches is as surprising as its perpendicular growth.

The many valuable properties of the Eucalyptus attracted the attention of the French Government several years ago. A specimen in the "Jardin d'Acclimation," at Algiers, excited the admiration of the Emperor while on a visit to that place, and on measuring the tree it was found to have made a height of thirty feet and a diameter of six inches in two years.

Since that time it has been extensively cultivated in Algiers, and of late it has been stated that it is making rapid progress in the South of France, Spain, and Corsica, especially on account of its alleged virtues as a remedy for fever.

In Spain its efficacy in cases of intermittent and marsh fevers has gained for it the name of fever-tree. It is a powerful tonic and diffusible stimulant, performs remarkable cures in cases of chronic catarrh and dyspepsia, is an excellent antiseptic application for wounds, and tans the skins of dead animals, giving the fragrance of Russia leather. The fresh leaves are used in the form of fomentations, and applied externally in severe cases of rheumatism, neuralgia, gout, etc. The tree prefers a marshy soil, in which it grows to a great height very rapidly. It dries the earth under it by evaporation from its leaves, and shelters it from the sun, thus preventing the generation of marsh miasm.

Firs.—The Red Fir or Douglass Spruce (*Abies Douglassii*) is one of the grandest of our forest trees, attaining frequently a height of 300 feet and a diameter of 10 feet. The timber is much used for rough work to be exposed to the weather.

The Leafy-coated Silver Fir (*Picea* or *Abies bracteata*) flourishes in Upper California at an elevation of 3000 feet above the sea. This tree produces a resinous gum used by the Catholic priests as an incense.

White Fir—(*Picea grandis*).—This fir attains a height of 150 feet and a diameter of 7 feet. The bark of the young tree contains numerous cysts, full of the resinous fluid "balsam of fir."

Laurel.—California Laurel or Bay Tree (*Oreodaphne Californica*), a beautiful evergreen, abounds in the coast valleys, where it grows to a height of 50 feet, with a trunk sometimes 30 inches in diameter. Leaves dark green, lustrous, 4 inches long, 1 wide, acuminate, foliage dense. The leaves have an aromatic odor resembling bay rum, and are used by some as a condiment. Called sometimes spice-tree. The leaves are known to produce a kind of vertigo with some. It is also an excitant to the circulation.

Madrona Tree—*Arbutus Menziesii*.—This evergreen, one of the most striking trees of the California forest, acquires not unfrequently a height of 100 feet, diameter 2 to 3 feet. Grows open, somewhat like a maple; leaves of a bright green, and oval shaped, 3 or more inches in length. Bark of a bright red, smooth, and of an astringent taste. Much used for diarrhœas and fluxes. The tree bears a bright-red berry, in clusters, of which the birds are fond.

Manzanita—*Arctostaphylos glauca*.—The manzanita, by the peculiar shade of green of its foliage, and short claret-colored stem, early receives the notice

of the stranger, and is familiar to all residents of the State. Experience has proved it to be a most valuable medicine, rivalling and excelling in its therapeutic effects many well-known and costly foreign drugs.

The stems of the manzanita are of a hard texture, and of a dense claret color, radiating from a common centre close to the surface of the ground. The foliage is of a bright shade of green, and thickly clustering upon the branches. The average height is 7 to 10 feet, and the peculiar spreading out of its branches makes its breadth equal to its height. The wood is dense, hard, and darkened in color, and when properly seasoned is much sought after for the manufacture of canes, umbrella handles, smoking-pipes, and similar articles. In the spring it bears a pinkish-white blossom, in clusters, which later on in the season are replaced by round red berries about half an inch in diameter, of a pleasant acidulous taste, being often eaten by the aborigines, as well as the grizzly bears, hence one of the names by which it is known, "bear-berry." The name "manzanita" is derived from the Spanish word *manza* (apple), and signifies "little apple." The leaves are the portion of the plant used in medicine. When chewed they excite the flow of saliva, and give a peculiar, strongly astringent, slightly bitter taste, afterwards sweetish.

Manzanita is astringent and tonic, with a specific direction to the urinary organs. Diabetes, catarrh of the bladder, incontinence of urine, leucorrhœa, and menorrhagia are alleviated and often cured by the use of the manzanita.

Wild Nutmeg—Torreya Californica.—Found in the Coast mountains, near the Bay of San Francisco, and on the seaboard as far as the northern part of the State. This graceful and beautiful evergreen tree grows from 50 to 75 feet high. The fruit is like a nutmeg in size and shape, but possesses a disagreeable terebinthinate taste, and is never used as a condiment.

Oaks.—The principal trees of this family are:

Quercus agrifolia—California Live Oak.—It flourishes on river-banks and near the coast. Bark thick and abounding in tannin.

Q. Hindsii—California White Oak.—This is the characteristic oak of California. It seldom reaches a greater height than 60 feet, and in its expansive branches is often wider than it is high. The acorns are large, sometimes 2½ inches long, and formerly constituted the chief article of food of the natives of the soil.

Q. lobata—The Burr Oak of California.—This is the most common and largest oak of California. It is found in all the valleys of the interior. It is a large and beautiful tree, being the oak with its drooping and spreading branches which imparts such a picturesque charm to the landscape of California. This tree presents the largest trunk of our foliaceous trees. Abounds in excrescences (called "oak-balls") containing a notable percentage of tannin.

Q. densiflora—Chestnut Oak of California.—Along the Coast Range, increasing towards the north from Santa Cruz to Medocino City, occurs only in or near the redwoods. This tree attains a considerable height in dense woods, and is then sparingly branched; leaves and acorns abundant. The bark is particularly rich in tannin, and is used as a tonic and astringent by rural practitioners.

Pines.—The later classification divides the pines of California into sixteen true species. The conifers of the Pacific Coast exhibit a symmetry and perfection of figure, as well as healthfulness and vigor of growth, not attained by similar trees in any other part of the world. Some of the trees have persistent cones, retaining them from ten to twenty years. Others retain them but two years, while others again throw off a series of cones every year.

Pinus insignis, the Monterey pine, is cultivated in San Francisco. It is a tree growing 60 to 100 feet high. Foliage dense and vivid green color, bark thick and rimose. Used for planking streets and building purposes.

Pinus ponderosa, or yellow pine, attains a height of 225 feet or more, and a circumference of 28 feet. The leaves grow in triplets on the ends of the branches, presenting a tufted appearance; their color dark yellowish-green, the bark of a light yellowish-brown, and is divided into large smooth plates, from 4 to 8 inches wide, and from 12 to 20 inches long, whereby the tree is recognizable at a distance. The yellow pine is found at Russian Valley, south of Clear Lake, the Sierra, and the coast.

Pinus Lambertiana, the well-known sugar pine, grows usually at great altitudes. The mature tree sometimes reaches a height of 300 feet, and a diameter of 10 to 15 feet; leaves 3 inches long, of a dark-bluish green; grows in groups of five; foliage not dense; cones large. The wood is white, soft, and homogeneous, used much for inside work. The tree derives its name from a sweet resinous gum, which exudes from the duramen or hard-wood portions. This substance, in appearance, granulation, and taste resembles the manna of the drug-stores, except by a slight terebinthinate flavor. It is found only in small quantities, and has cathartic properties.

Pinus Sabiniana.—This is the "nut pine" of the foothills, sometimes called the "scrub pine," or "silver pine," and is found on the lower slopes of the Coast Range and Sierra Nevada, occupying the drier positions; leaves from 4 to 10 inches long, growing in threes. The California Indians formerly gathered the nuts from the cones, they being with them a favorite article of food. The woodpecker selects them as storehouses for its winter food, cutting holes in the bark, and putting an acorn in each.

Redwoods—*Sequoia sempervirens*.—This tree, first discovered by Menzies in 1796, is only second in size while it stands first in value of the mighty forest trees of California. The redwood belongs exclusively to the foggy regions of the Coast Range. A property peculiar to this species is the great power it possesses in condensing fogs and mists. A heavy fog is always turned by it into rain, wetting the soil and supplying springs during the dry season.

The oldest of the redwoods is about 1500 years of age, considered to be the second generation of the race. The bulbous expansion of these trees near the base is composed of an enlargement of the roots growing together and forming a complete network. Around the base of each of these trees lie from 10,000 to 14,000 buds partially developed, possessing each the power, under favorable circumstances, of being developed and forming a perfect tree. The mass of wood contained in a good-sized tree of this kind, 25 feet in diameter, is equal to 40,000 cubic feet, weighing over 2,500,000 pounds.

Sequoia gigantea—*Mammoth or Big Trees*.—The *Sequoia* is found only in California, there being but six or seven groves of the *S. gigantea* in the entire State. Three of these groves are in Mariposa County, one in Calaveras, one in Tuolumne, and two or three in Tulare County. One peculiarity of this tree consists in its bearing two kinds of leaves, those on the young trees and on the lower branches of the larger ones being about $\frac{5}{8}$ ths of an inch long and $\frac{1}{8}$ th wide. They are set in pairs opposite each other on little stems. The other kind of leaves grow on the branches that have borne flowers, are triangular in shape, about $\frac{1}{8}$ th of an inch long, and lie close down to the stem. The cones, solitary or two or three together on long pedicels, are not much larger than a hen's egg, while the cones of many small conifers of the Pacific Coast are larger than pineapples. The seeds of the *S. gigantea* are not more than $\frac{1}{4}$ th of an inch long and $\frac{1}{8}$ th wide, and almost as thin as writing paper, it taking about 50,000 of them to weigh a pound.

The bark is constructed on a different plan from that of most other trees, it being deeply corrugated longitudinally. The corrugated layers are of a harder texture, and the interstices are packed with an elastic spongy substance. It is reddish-brown in color, generally very thick, on the large trees not less than 18 inches. The larger of the standing trees in the Calaveras grove range in size from 275 to 375 feet in height, and from 50 to 65 feet in circumference, some of the prostrate trees having been *originally of larger dimensions*.

Grasses.—The grasses of California are numerous in variety, and the most of them suitable for pasturage, although not many well adapted for making hay.

Avena fatua, the *Wild Oat*.—Among the indigenous nutritious grasses this is the best for making fodder, save the cereals sown expressly for the purpose. It grows luxuriantly, surpassing in some localities the cultivated grain in height, size, and abundance of stalks.

Alfilerilla—*Erodium cicutarium*.—This is a succulent, sweet, hardy grass, bearing clusters of spikes or pins an inch and a half long. These spikes have given it the name of pin-grass, and the resemblance of its leaves to the geranium has suggested the name of "wild geranium." Cattle prefer it to every indigenous herb of the State.

Atropis Californica, or squirrel grass, comes in after the wild oats have become exterminated by close feeding. Common throughout the State; perennial.

Arrhenatherum avenaceum, or *Oat Grass*.—In Germany this is known under the name of "French rug grass." The roots are stoloniferous, perennial, and spread rapidly. The culms attain a height of three to five feet; leaves plentiful and large. It yields a good deal of hay in dry, fertile soils.

Bitter Weed—*Helenium puberulum*.—This plant is also known under the names of swamp grass or sneeze weeds, and grows in swamp lands, and low, moist places. A tall spathe-like stem, capped with a small, yellowish head. Extremely bitter to the taste. Dust penetrating and errhine. A fine tonic and alterative.

Bryzopyrum Douglassii and *B. spicatum*.—The former thrives in the drift-

ing sand-hills peculiar to the region around San Francisco. It grows a low, beautiful, dioecious, perennial grass, with extremely long runners, adapted to confining the loose sand, and preventing it drifting further inland. The latter, called also "spike grass," grows in salt marshes around the bay of San Francisco, and upon saline soils in the interior.

Festuca scabrella—*Bunch Grass*.—Occurs on the north hillsides and highly shaded woods, the less shaded the larger the tufts grow. During the winter cattle are fond of it, eating off the tufts as closely as possible. Abundant along the shady hillsides of the Coast Range.

Lolium temulentum—*Bearded Darnel*.—Very common among grain. Found in various parts of the State. Grains of this grass are considered noxious and poisonous to men and beasts. It is affirmed that this species of *Lolium* not only produces intoxication, as its specific name implies, but that if baked into bread, or fermented in ale, it produces headaches, vertigo, vomiting, lethargy, drunkenness, and difficulty of speech, causing a trembling of the tongue, and even fatal effects.

Millium Lendigerum.—This grass comes on the dry hillsides late in the season. It has not before been noted as a North American plant. It is stated to have been found in Chili, South America. It is one of the few annual gregarious grasses that cover our hills. Some consider it an introduced species; but its general distribution over the State, its character, with the fact that it is a native of the countries of the Mediterranean (with which we have so many plants in common, especially of the lower orders), favor the presumption of its being an indigenous grass.

Plants and Shrubs—*Barberry, or Holly-leaved Barberry, also called the Oregon Grape*—The following notice of the four varieties of the *Berberis* family common to the Pacific Coast, is condensed from a very comprehensive monograph published in 1878 by Messrs. C. G. and J. U. Lloyd, of Cincinnati, O., and entitled "*Berberidaceæ*," etc.:

There are four indigenous species of the *Berberis* found in the United States, all west of the Mississippi, the *B. nervosa*, *B. repens*, *B. pinnata*, and the *B. aquifolium*.

B. nervosa.—This is a little erect shrub, with leaves often longer than the stem. The leaves consist of three to six pairs of leaflets and an odd one. The main stalk of each leaf is very conspicuously jointed at each pair of leaflets, "like a bamboo stem." The leaflets are ovate, lanceolate, acute, or acuminate, triple veined from the oblique base, and have teeth not repant but serrate. The flowers are in erect racemes, which are more slender than those of any other species.

B. repens.—A small shrub, procumbent, with short erect branches. The leaves are often ternate, but generally of five or seven leaflets. Leaflets are ovate, orbicular, acute, or the terminal leaflet obtuse; pinnately veined, with repant teeth. Flowers in terminal fascicled racemes.

B. pinnata.—This is about the same size as the *B. aquifolium*, and liable to be taken therefor. The leaflets are lanceolate, acuminate, and of a light-green color, glaucous on the under side. There are two to six, seldom more,

large teeth on each side of the leaflet, each ending in a slender spine. The leaflets are approximate to the base of the common petiole.

B. aquifolium.—The leaves are shiny and dark green, lighter on the under side. The stem is erect, branching, 8 to 6 feet high. Leaves generally three pairs leaflets and an odd one. Leaflets ovate, lanceolate, acute, sessile, pinnately veined, with 15 to 30 short spring teeth on each leaflet; lower pair distant from the petiole. Flowers in fascicled, terminal racemes, yellow. Pedicels slender.

B. aquifolium is a thrifty, rapid-growing shrub, attaining, in favorable positions, the height of 4 to 6 feet in as many years. In its native country it grows in large clumps, forming a dense undergrowth. The root is the part used in medicine, and is from one-half to an inch in diameter (as found in commerce), increasing to three or more at the base of the stock. It is woody, yellow throughout, and very hard. The bark is deep yellow beneath, brown upon the surface, very rich in berberin, and both root and bark are extremely bitter.

The root is an excellent tonic, a good agent in the treatment of scrofulous affections, and perhaps secondary syphilis. The miners and Western settlers claim it to possess curative powers in skin diseases, scrofula, secondary syphilis, and even cancer and leprosy.

Buckthorns of California.—The "*Rhamnaceæ*" are shrubs or small trees, with simple undivided leaves, small and often caducous stipules, and small regular flowers; well distinguished from the related orders by the valvate æstivation of the calyx, and the perigynous stamens as many as its lobes, and alternate with them; the ovules solitary (rarely in pairs) and erect in the 2 to 4 cells of the ovary. Flowers sometimes polygamodioecious, often apetalous. A conspicuous disk adnate to or lining the short tube of the calyx. Petals often unguiculate, mostly involute, each around a stamen in the bud. Ovary either free or adnate by the disk to the tube or base of the calyx; style or stigma 2 to 4 lobed. Seeds solitary in the cells, anatropous, with a large straight embryo in sparing fleshy albumen; cotyledons flat or plano-convex; radicle short.

A widely distributed order of between 30 and 40 genera, and four or five hundred species, of which *Ceanothus* is the only extensive North American genus. The herbage has some bitterness and astringency, and the fruit when fleshy or juicy is commonly mawkish or nauseous, but edible in *Zizyphus*, one species of which furnishes the basis of "jujube paste."

The *Rhamnaceæ* of the Pacific Coast are divided as follows: I. *Rhamnus alnifolia*. II. *Rhamnus crocea*. III. *Rhamnus Californica*. IV. *Rhamnus tomentella*. V. *Rhamnus Purshiana*.

Rhamnus crocea.—Much branched, 8 to 15 feet high, the young branches pubescent; leaves evergreen, coriaceous, oblong, or obovate to orbicular, obtuse or retuse, or acute, equally variable at base, 3 to 18 lines long, acutely and often glandulously denticulate, glabrous, usually more or less yellowish-brown or copper-colored beneath; petioles a line long or less; flowers tetramerous, apetalous; fruit about three lines long, obovoid.

This species of *Rhamnus* frequents the hills and mountains of California,

from San Diego northward to Clear Lake, the Yosemite Valley, and the upper Sacramento, and eastward into Arizona.

The bark of the *R. crocea*, or "California Buckthorn," is not unpleasant to the taste, tinging the saliva red, and developing a sense of acidity in the mouth after chewing, reminding one of senega root. Much esteemed as a safe and pleasant laxative and cathartic, being particularly recommended for women and children.

Rhamnus Purshiana.—A shrub or small tree, sometimes 20 feet high or upwards; young branches tomentose; leaves elliptic, 2 to 7 inches in length, 1 to 3 in width, mostly acute, obtuse at base, denticulate, deciduous, somewhat pubescent beneath; flowers rather large, in a somewhat umbellate cyme; sepals, 5; petals minute, cucullate, bifid at the apex; fruit black, broadly obovoid, 4 lines long, 3 lobed and 8 seeded.

This is the celebrated "Cascara Sagrada" tree, and grows in more or less profusion in Northern California, Oregon, Washington Territory, and British Columbia. The bark is a sure and valuable cathartic, possessed of a certain characteristic and persistent bitterness, easily disguised, however, by admixture with the necessary vehicles.

Baneberry—Actæa Rubra—Red Baneberry.—Perennial, herbaceous. Stem two or three feet high; sends up in the spring one or more large compound leaves; flowers in April and May; oblong, egg-shaped, shining red berries, ripening in July and August. Berries reputed to be poisonous. The root is claimed to possess powerful purgative and emetic properties, is of a dark-brown color, and bears some resemblance to that of the *Helleborus niger*. The taste is sweetish and somewhat nauseous, speedily developing into a persistent and quite disagreeable bitter. Not familiar to local medical practice.

Canchalagua—Erythræa venusta—Natural Order Gentianaceæ.—Canchalagua grows from a span to a foot in height, simple and cymosely several-flowered at summit, or corymbosely branched; leaves from ovate to oblong lanceolate, rather obtuse (half to near an inch long). Calyx lobes very narrow down to the base; corolla deep and bright pink, with a yellow centre; the lobes oval and obtuse, becoming oblong, 4 to 6 lines in length; filaments rather longer than the oblong linear anthers.

Canchalagua occurs more or less plentifully through the southern part of the State, extending (mostly in a smaller form) along the Sierra Nevada to Sierra County, there growing at an altitude of 4000 feet. It is highly valued as a bitter tonic, and in much repute among the native Californians. Used by them as an antifebrile, and as an aid to enfeebled digestion and impaired nutrition.

Clover—Trifolium.—A genus of 200 or more species, in temperate and subtropical regions, chiefly of the Northern Hemisphere. In North America it is most largely represented on the western side, only 5 species being native in the Atlantic States, while 40 or more are found in the region west of the Rocky Mountains. On the Pacific Coast we have 26 species, but will only mention a few of the more important.

Red Clover—Trifolium pratense.—This is found in some parts of the State. The blossoms are the part used in medicine. Strong teas are used in domes-

tic practice as an application to ill-conditioned ulcers, and also as a remedy in whooping-cough.

White or Dutch Clover—Trifolium repens.—This has been introduced into the cooler parts of the State, and cultivated as a valuable forage plant.

Purple Clover—Trifolium tridentatum.—This species is common in California. No evidence is had of the use of this or the white clover as medicine in the State.

Sweet Clover—Melilotus parviflora.—This clover is naturalized in California, and recognized by its sweet odor. Cattle are quite fond of it. Sweet clover enters into the composition of cough mixtures, etc.

Consumption Weed—Bahia arachnoidea.—Eight species of Bahia occur in California. The *B. arachnoidea* or butterfly plant grows a foot or two high, loosely branched, woody at base, clothed with loose floccose wool. Involucre broadly campanulate, or hemispherical. The plant grows in open and shady places, especially among the redwoods. It has bright small yellow heads. It is a tonic bitter, given successfully in cases of consumption and weakened digestion, and in recovery from fevers.

Damiana—Turnera aphrodisiaca.—Varieties of this obscurely defined plant occur in the southern part of California and in Mexico, where it is acknowledged to be a great cure-all. It has laxative and tonic properties, and has come into notice of late years for its reputed virtues as an aphrodisiac. Attempts have been made to procure the flower, but without success, as it grows in hilly regions, and has to be transported in small bags on the backs of animals.

Durango Plant—Tricerastes glomerata.—Erect, 2 or 3 feet high or more, branching; leaves ovate to lanceolate, acuminate, 6 inches long, the numerous floral ones shorter and more narrowly lanceolate; flowers 4 to 7 in each axil of the elongated leafy raceme, the fertile mostly perfect; anthers nearly sessile, 2 lines long; styles larger than the ovary; capsule oblong-ovate, 3 to 4 lines long, slightly narrowed toward the truncate, triangular 3-toothed summit. On stream banks from Napa County to San Bernardino, and in the foothills of the Sierra Nevada from Amador to Tuolumne counties. A valuable bitter tonic and stimulant to the digestive and arterial systems.

El Gobernador—Larrea Mexicana.—Sometimes called the creasote bush. Diffusely branched, 4 to 10 feet high, densely leafy, of a yellowish hue; the thick resinous leaflets inequilateral, oblong, 3 to 6 lines long; abundant in the interior of the southern parts of the State. The leaves are sticky with a strongly scented gum or resin, and burn with a black smoke and rank odor. Highly esteemed by the natives as a tonic and corrective of the system.

Flaxwort—Linum.—The California species of this genus (consisting of eleven in number) are mostly slender annuals, remarkable for having only 2 or 3 pistils, and forming a peculiar section.

L. usitatissimum.—This, the common flax of cultivation, may be found in new fields. In California it is an annual, with linear-lanceolate, very acute leaves; blue flowers, 1-nerved sepals, and a globose acuminate capsule.

L. Californicum.—Glabrous and glaucous, paniculately branched above, 6

to 18 inches high; stipular glands conspicuous; flowers in small cymes, or the lower solitary; sepals ovate-lanceolate, $1\frac{1}{2}$ lines long, acute, slightly glandulously-toothed; petals 4 lines long, rose-colored becoming white, 8-appendaged at base; capsule acute, shorter than the calyx. This species occurs in the valleys and on low foothills in spring from San Francisco Bay to Marysville, and southward to San Carlos. Especially common on the eastern slope of Mount Diablo Range.

The seed from the *L. usitatissimum* is collected and cleaned and brought into the city, supplying the drug-stores. Some considerable amount of oil is also expressed in local factories. The California flaxseed is somewhat larger than the Eastern seed. It appears to possess identical properties.

Fleabane of California—Coryza salicifolia.—This plant abounds in salt and fresh water marshes and in shallow upland ponds; perennial, evergreen, blooming from September to April; 6 to 10 feet high, resembling a willow at a distance.

Leaves lanceolate; plant and leaves when burned emit an unpleasant odor, something like a mixture of camphor and bitterweed. It is employed to make flea powder, for which purpose it answers very well, and also for dispersing gnats.

Fly Plant—Mimulus.—Of this genus no less than 28 species occur in California, some still further divided in more or less varieties.

M. glutinosus is the only species that has as yet been applied medicinally in California. It grows from 2 to 6 feet high, nearly glabrous or minutely pubescent; leaves from narrowly-oblong to linear-lanceolate, and from minutely dentate to nearly entire (1 to 4 inches long), the margins inclined to be revolute; peduncles in the axils of the leaves, either a little or much shorter than the narrow prismatic calyx; corolla $1\frac{1}{2}$ to 2 inches long in the typical form, buff or salmon color; the lobes either cross-toothed or emarginate.

It inhabits dry and rocky banks, common from San Diego to San Francisco Bay and surroundings. Common and ornamental in cultivation, especially as a greenhouse plant; flowering almost through the year. Even in the wild state it exhibits a great diversity of colors.

In domestic practice the fly plant has acquired celebrity as curing dysentery, diarrhoea, fluxes, etc.

Grindelia.—The name Grindelia applied to the different species of the same family has come to be of common use, although in California it is still called by the common people "*Rosin Weed*."

The Grindelia family is of the order Compositæ, and is botanically described as follows:

Heads solitary, terminating leafy branches, or occasionally more or less corymbose, heterogamous with rays fertile, or in one species homogamous (rayless), many-flowered. Involucre hemispherical, or globular, commonly coated with resin or balsam; its scales very numerous, imbricated, narrow, with coriaceous appressed base and slender more or less spreading or squarrose green tips. Receptacle flat or convex, alveolate. Rays numerous, narrow. Branches of the style tipped with a lanceolate or linear appendage. Akenes compressed or turgid, or the outermost somewhat triangular, gla-

brous, truncate. Pappus of 2 to 8 caducous awns or stout corneous bristles. Biennial or perennial and mostly coarse herbs, with sessile or partly clasping leaves, often viscid or resinous, and middle-sized or rather large heads of yellow flowers.

A characteristic genus of the plains west of the Mississippi, extending to the Pacific Coast and to Mexico, with two or three species in similar regions in South America, not over a dozen or so in all. But they are difficult of discrimination, especially the Western species, which are all different from the Eastern. Some good characters may be furnished by the ripe akenes, which are known in a few species.

In Gray and Watson's "Botany of California" (now out of print) the following is the arrangement of the California *Grindelias*:

I. *Grindelia hirsutula*. II. *Grindelia glutinosa*. III. *Grindelia robusta*, subdivided into (1) *G. latifolia*, (2) *G. angustifolia*, (3) *G. rigida*, (4) *G. integrifolia*, (5) *G. discoidea*. IV. *Grindelia humilis*.

Grindelia robusta.—Very glabrous, pale, usually stout; leaves from broadly spatulate or oblong to lanceolate, or the upper cordate-clasping, commonly obtuse, sharply more or less serrate; involucre with at length squarrose tips; pappus of 2 to 3 or rarely 5 rigid and flattish, nearly smooth, awns; akenes mostly 8-toothed at the apex.

Grindelia is easily recognized by the casual observer by its slim stalks, thin narrow leaves, and characteristic yellow heads, flowering from June to October. Just before flowering the unexpanded heads or buds secrete a quantity of resinous matter, white and sticky like balsam, that is finally, after the flower expands, distributed like varnish over the petals. At this time the plant abounds most in the balsamic resinous juice in which its medicinal properties reside.

Grindelia robusta is used with success in the alleviation and cure of the distressing eruption and inflammation caused to many by the well-known "poison oak," or *Rhus diversiloba* of California. Also used with good results in asthma, bronchitis, difficulty of breathing arising from weak lungs, coughs, etc. Also given in iritis and as a topical application to ill-conditioned ulcers.

Grindelia squarrosa.—This species is glabrous and viscidly resinous; the leaves rather rigid, glaucous, and punctate, varying between spatulate-lanceolate and oblong, the upper ones sessile, partly clasping, rather obtuse, and finely-toothed; the involucreal scales with very long reflexed, squarrose, subulate points.

G. squarrosa is claimed to have powerful curative effects in various malarial disorders, and useful in cases of enlarged spleen.

Kidney Root—Baccharis pilularis.—A shrub 2 to 4 feet high, glutinous; leaves sessile, obovate, or cuneiform, about an inch long, coarsely or sinuately few toothed, or occasionally entire; heads 2 or 3 or more, in a cluster from the axils of the upper leaves, globular, 2 or three lines long, the pappus becoming 4 or 5 lines long. Common in sandy soil along the whole length of the coast. Used in medicine (the root and lower part of the stalks) for catarrh of the bladder, etc.

Life Everlasting, or California White Balsam—Gnaphalium macrocephalum.—White, woolly, not glandular, stems a foot or two high, slender; leaves linear or the lower oblanceolate (an inch or so in length), slightly decurrent; heads in numerous small clusters terminating the paniculate branches; involucre cylindraceous, becoming narrowly campanulate; the scales dull white, obtuse, or acutish. Heads 2 or 3 lines long. Properties anodyne, diuretic, soporific, and sudorific.

Quinine Bush of California—Garrya Fremontii.—A shrub 5 to 10 feet high, becoming glabrous; leaves ovate to oblong, not undulate, $1\frac{1}{2}$ to $2\frac{1}{2}$ inches long, acute at each end, or petioles 4 to 6 lines long; aments solitary, 2 to 3 inches long, with acute somewhat silky bracts; the fertile aments rather slender; ovaries nearly glabrous, fruit globose, 2 to $2\frac{1}{2}$ lines in diameter, shortly pedicellate. Abounds mostly in the Coast Range. Used in fever and ague, and as a bitter tonic, the leaves being the part used.

Rattleweed of California.—This poisonous plant belongs to the genus *Astragalus*, of which there are no less than 48 species in this State.

A. Nuttallianus.—More or less pubescent or hoary, with white appressed hairs, soon diffusely branched from the base; leaflets 11 to 18, oblong or broadly linear and mostly notched on the end; calyx teeth slender and as long as the tube; corolla whitish and purple, about 3 lines long; the keel with the inflexed tip narrowed; pod over $\frac{1}{2}$ an inch long, latterly flattish, slightly scythe-shaped, the incurvation mostly near the base, deeply grooved on the back, acutish on the other edge, several-seeded; the surface minutely reticulated, either glabrous or with minute appressed hairs.

In close-cropped fields, where horses and cattle are pinched for hunger, it is sometimes eaten and is apt to prove fatal. This plant is a pest of high dry pastures, those presumed to be best adapted for sheep grazing. The symptoms are a peculiar infatuation or intoxication, under the effects of which the animal becomes stupid, and finally pines away and dies.

Loco Weed—Oxytropis campestris.—Order Leguminosæ, sub-order Astragalaceæ. Pubescent or smoothish, calyx 5-toothed, corolla usually long or narrow; standard narrow, equalling or exceeding the wings; the keel tipped with a sharp projecting point or appendage; stamens diadelphous, stigma minute terminal, pod many-seeded, ovate or oblong-lanceolate, of a thin or papery texture; seed stalks slender; pinnate leaves of many leaflets, naked scapes bearing a head or short spike of flowers. Flowers yellowish, cream-colored, or white, often tipped with purple. It is a low acaulescent, perennial, with tufts of numerous very short stems from a hard and thick root or root-stalk.

Loco (from the Spanish, signifying "crazy") weed flourishes in the fall of the year, the other herbage being dry and withered, and attracting, by its juicy succulence, horses and cattle, who after eating it become crazed, and, separating from the herd, wander off by themselves, appearing unconscious of anything. Evidently a powerful narcotic, and deserves careful investigation.

Pitcher Plant—Sarracenia purpurea.—Found a few miles south of Mount Shasta, along marshy banks of creeks; flower-stems two to four feet high;

flowers pale purple, two inches across, bloom in May; leaves contorted, and about three feet long; flowers pitcher-shaped, the California species differing from those elsewhere in having the opening on the lower side; hence it contains less water—only such moisture as it gathers from evaporation or its own secretions. The throat of the orifice exudes a sweetish substance, attractive to flies and other insects, which having entered it are unable to escape, owing to the inside of the flower being set with slender hairs pointing downwards, like the wires in a mouse trap. In this manner the trumpet-like flower becomes often filled with the fetid accumulations of the decaying insects.*

It is considered both a preventive and sovereign cure for small-pox, the Indians having the greatest confidence in its virtues as such.

Poison Oak of California—Rhus diversiloba.—This shrub grows abundantly in the Sacramento basin and along the coast. If it can attach itself to an oak tree it becomes a parasitic vine, and attains a thickness, though rarely, of four inches in the trunk, and climbs to a height of 40 feet. To some persons the touch of the leaf is poisonous, causing an irritating eruption of the skin; its effect is sometimes felt even by passing to the leeward of the bush on a windy day, or going through the smoke of a fire in which it is burning.

Poison oak is the cause of a vast deal of suffering in California. There is scarcely ever a time in any little town or neighborhood when there are not one or more persons suffering from it, and it has been estimated that there are in this State near three thousand persons constantly affected with the cutaneous disease caused by this dreaded scourge. Of all the remedies which have acquired a local celebrity for this painful eruption, the *Grindelia robusta* meets with the most success.

Spikenard of California—Aralia Californica.—The *Aralia* family has but few representatives in California. It flourishes in shaded mountain ravines and moist places. It much resembles in appearance the Eastern *A. racemosa*, save its greater size, finer umbels, larger and more numerous rays, and larger flowers and involucre, as well as much larger root, which is the medicinal portion of the plant. Used with success in cases of weak or inflamed lungs, night sweats, pleurisy, and other troubles of the lungs and throat.

Soap Plant—Chlorogalum Pomeridianum.—The "Amole" of the early Spanish settlers. The bulbous root contains a large quantity of saponin, and when rubbed in water makes a lather, like soap, and is good for removing dirt and grease. It was extensively used by the Indians and Spanish Californians previous to the American conquest. The amole has a stalk 4 or 5 feet high, from which branches, about 18 inches long, spring out. The branches are covered with buds (buds), which open in the night, beginning on the root of the boughs, about 4 inches of a branch opening at a time. It is found in the inland valleys.

Tarweeds of California.—The true tarweeds are 4 in number, all more or less possessed of an inherent tarry stickiness and a high characteristic odor. They are the blue tarweed (*Trichostema lanceolata*), green tarweed (*Hemizonia truncata*), white tarweed (*Hemizonia luzulæfolia*), yellow tarweed (*Hemizonia corymbosa*).

* From the description given, the plant cannot be a *Sarracenia*.—EDITOR.

The blue tarweed is possessed of terebinthinate properties, while the white and yellow are known to be valuable cholagogue cathartics. Space forbids a detailed description, but they will doubtless be better known to the medical world, as they are by no means contemptible exhibitions to our native *Materia Medica*.

Wild Sunflower—Wyethia helenioides.—This is a low clinging plant, save the central stalk, which rises out of a circular mass of leaves to 1½ to 2 feet in height, bearing a large flower shaped not unlike a pond lily. The root is the part of the plant used in medicine, and possesses diaphoretic and diuretic properties, and deserves to be critically investigated.

Yarrow—Achillea millefolium.—This variety of *Achillea* is quite prevalent in California, growing to about 2 feet in height, and possessing similar types to the Eastern. It is easily recognized by its bunches or heads (crowded in a compound corymb-like cyme) of a lively whitish hue, and the tansy-like look and smell of its leaves. Used with success by many of our local practitioners as an emmenagogue.

Yerba Mansa—Megarrhiza Californica.—The *Yerba Mansa* or *Marra* is a vinelike plant, sending out enormously long runners or creepers, and possessing an enormous root shaped like a huge beet, and sometimes called "Man-root." It is intensely bitter (the root), and was used in fever and ague as a substitute for quinine, etc. It is a drastic cathartic.

Yerba Buena—Micromeria Douglassii.—In the valleys of the Coast Range is found a sweet-scented shrub known as the *yerba buena* (from the Spanish, signifying good or blessed herb or plant, in allusion to its well-known curative properties). It is a vine creeping mostly upon the surface of the ground, or nestling in the underbrush of our redwood forests, and in its leaves, etc., bears, in appearance, a likeness to the wild strawberry. *Yerba buena* has been long known to the natives of California as possessing remedial virtues, and was in frequent use before the occupation of the country by the Americans. When freshly gathered it charms by its grateful perfume, peculiarly sweet and aromatic, becoming, when dry, a strong scent analogous to a mixture of the two odors of peppermint and camphor. *Yerba buena* is a grateful aromatic stimulant, and is much given as a stomachic, carminative, and anthelmintic. It also allays nausea, spasmodic pain in the stomach, and colic pains in the bowels.

Yerba Santa—Eriodictyon Californicum.—This plant, peculiar to California (although occurring also in South America) has come into extended notice of late years, and a great variety of experience seems to have resulted from trials of its properties. It seems to be a valuable addition to cough and pectoral balsams and mixtures, and has a local celebrity for rheumatism, etc. It is given sometimes alone, and in conjunction with various alteratives, expectorants, etc.

Yerba Reuma—Frankenia grandifolia —This marsh plant thrives in the tide lands bordering San Francisco Bay and the interior. It grows thickly, and bears the appearance, at a distance, of covering the soft oozy swamp lands like a green carpet. In spring it bears plentiful pinkish flowers. The whole plant, gathered after flowering, is used in medicine. When chewed it devel-

ops in the mouth an intense salty taste, soon passing into astringent, with a peculiar acidity. It is vaunted as corrective to fluxes or flows from mucous surfaces, and local practitioners claim a high place for it in the *Materia Medica* as a curative agent.

MINERAL SPRINGS.

Mineral springs are more abundant in California and Nevada than in any other equal area in the civilized world. They are especially numerous in the Coast mountains and valleys, for a distance of 100 miles northward from San Pablo Bay (the northernmost branch of San Francisco Bay), above Mount Lassen, and on the eastern base of the main ridge of the Sierra Nevada, near the Oregon line. These districts were the sites of great volcanic activity in a remote age, and the subterranean heat even comes near to the surface of the ground.

At the "Geysers" large quantities of hot steam rise constantly from blow-holes; and at the sulphur bank near Clear Lake the earth, at a depth of a few feet, is scalding hot. Many of the springs are warm or hot, and strong with different mineral combinations. Not many as yet have been analyzed.

The Vichy and Ems, the two most famous alkaline springs of Europe, are prescribed for the same diseases, and yet we find that the former has twice as many grains of the active carbonates, and three times as many of the active sulphates to the gallon as the latter, and the proportions of these carbonates and sulphates to one another and to the water are not the same. Vichy has 208 grains of carbonate of soda, while Ems has 84; the former has 16 of carbonate of potash and 18 of sulphate of soda, and the latter none of either.

The only substances found relatively in large quantity in mineral springs, and supposed to exercise a strong curative influence when taken in artificial preparations internally, are carbonates of soda, magnesia, iron, and potash, and sulphates of soda, potash, and magnesia. The carbonate of potash and the sulphates of potash and soda are seldom prescribed by physicians, being considered harsh or unpleasant as compared with other salts.

The carbonates and sulphates of lime, silica, and alumina, found in considerable proportion in some waters, are inert, and may be considered medically valueless. The chloride of sodium seems to be prevalent in all, and has doubtless a beneficial action on the animal economy. Some contend that the carbonic acid and sulphuretted hydrogen gases found in considerable quantities in many of the mineral waters have little curative powers.

Iodides and bromides are rare and in small proportion in most mineral waters, but potent and valuable. The leading classes of mineral springs are the alkaline, with carbonates predominant; the saline, with chlorides; the chalybeate, with a good proportion of iron and weak otherwise; the purgative, with sulphates; the sulphur, with an odor of sulphur, and without much strength in either carbonates, chlorides, or sulphates; and the thermal, which are prized mainly for bathing purposes.

Springs of all these classes, save the purgative, abound in California and Nevada, and probably after more have been examined purgative will be found

also. The following is a table of the number of grains in a gallon of the water of various alkaline springs. Some are Californian, and are placed alongside of the older and more widely known for purpose of comparison. Wherever in that or the following tables the quantity of any solid given is less than half a grain, the amount is indicated by an asterisk :

CONSTITUENTS.	Vichy.	Cal. New Almaden.	Ems.	Cal. Etna.	Fachingen.	Cal. Adams.	Cal. Sanel.	Pacific Congress.
Carb. soda.....	208	201	84	75	156	57	53	62
Carb. magnesia....	11		7	14	11	99	45	
Carb. lime.....	18	32	10	10	16	29	70	9
Carb. iron.....	*		*		1	1		7
Carb. potash.....	16							
Sulph. soda.....	18		*	8	1			6
Sulph. magnesia...		12						
Sulph. lime.....		42						
Sulph. potash.....			3			*		
Chlor. sodium.....	33	34	62	29	86	4	17	60
Chlor. lime.....	6				*			
Phosphate soda....								
Total solids.....	311	432	170	137	223	199	186	168
Carbonic acid.....	117	112	54	58	264	304		
Temp. F.....	105°		115°	98°	50°			

The carbonates of soda in the New Almaden, Etna, and Sanel, the carbonate of magnesia in the Etna, and the carbonate of lime in the New Almaden, are double, or bicarbonates.

The Vichy water, for a large class of diseases, is considered the best in the world ; that is, it is the best known as having been effective in a large number of cases. It is valuable in dyspepsia, diseases of the liver, diabetes, gall-stones, gout, and paludal cachexia. The Ems water is useful in chronic bronchitis, granular pharyngitis, and catarrhs of the stomach, hepatic ducts, bladder, and uterus. It will be observed that the New Almaden Spring, sixty miles south of San Francisco, has a close resemblance to the Vichy, and the Etna, in Pope Valley, seventy miles north of San Francisco, to the Ems.

The New Almaden Spring has attracted few visitors, mostly, perhaps, because it is in the vicinity of a large number of rude laborers employed in the New Almaden Quicksilver Mine. The Adams, which for several years past has attracted more visitors than any other Californian spring that has been analyzed, is decidedly inferior to the New Almaden or the Etna.

The last, at the eastern base of Mount St. Helena, in a little valley surrounded by mountains, with shade, game, beautiful walks, drives, and abundant water, eighteen miles from a railroad station, is well fitted to be a favorite resort for poor as well as rich invalids.

The Congress Spring at Saratoga, sixty miles south of San Francisco, might be classed with the chalybeates, though generally called alkaline. As an alkaline chalybeate it has no superior.

It will be observed that in some springs carbonates are reported, in others bicarbonates. Wherever there is *free* carbonic acid most of its salts are bicar-

bonates, but some chemists reduce them to carbonates. The following are the leading chalybeate and thermal springs of Europe and California :

CONSTITUENTS.	Schwal- bach.	Spa.	Cal. Napa soda.	Cal. Geyser.	Cal. Skaggs's.	Gastein.	Schlangen- bad.	Cal. Callatoga.
Carb. soda.....	1	6	13	23	24	*	1	8
Carb. magnesia.....	8	2	26	10	10	*	*	
Carb. lime.....	9	5	11	5	5	2	2	
Carb. iron.....	4	5	8	4	4	*		
Sulph. soda.....	*		2	8	8	12		2
Sulph. potash.....	*					*	1	
Chlor. sodium.....	*	1	5	10	10	2	15	22
Chlor. calcium.....								3
Chlor. magnesium		1						
Total solids.....	25	20	69	57	57	21	20	38
Carbonic acid.....	401	572				5		
Temperature.....	41°	61°	50°			{ 87° 160°	{ 82° 89°	97°

The carbonate of soda in the Napa, Geyser, and Skaggs's, and the carbonate of magnesia in the Geyser and Skaggs's springs are double or bicarbonates. Napa soda has a reputation of being among the best chalybeate waters. It is rich in iron, and its active salts are good in their kind, amount, and proportion. About 720,000 bottles (equal to 45,000 gallons) of the water (put up at the springs) are sold annually in San Francisco, where it is consumed largely as a pleasant beverage, and a check upon the after-effects of distilled and fermented liquors. The spring is situated thirty-five miles north of San Francisco, about one thousand feet above the sea, on the western slope of the ridge east of Napa Valley, commanding an extensive and charming view.

The analysis of Napa soda-water is as follows :

Temperature 68° Fahrenheit. Residium from evaporation in a gallon 68.76 grains.

Bicarbonate soda,	13.12 grains.
Carbonate magnesia,	26.12 "
Carbonate lime,	10.88 "
Chloride sodium,	5.20 "
Subcarbonate iron,	7.84 "
Sulphate soda,	1.84 "
Silicious acid, . . . . .	.68 "
Alumina, . . . . .	.60 "
Loss,	2.48 "
	<hr/> 68.76 "

The most noted European thermal springs that are warm without any strong mineral character are the *Gastein* and *Schlangenbad*. The former has a repute for curing paralysis, chronic rheumatism, and certain forms of weakness; the latter for skin diseases, rheumatism, gout, hysteria, and erethism

of the nervous system. The Calistoga water (California) bears a close resemblance to them, and is doubtless equally good for drinking, while for bathing, on account of its large proportion of chlorides of sodium and lime, it should be better. It will be observed that Vichy, which is drank in large quantities, has twice as much chloride of calcium as Calistoga. The temperature is also better than at Schlangenbad, and has very nearly the best degree of warmth for a thermal spring. The following are the leading sulphur springs:

CONSTITUENTS.	Aix-la-Chapelle.	Aix-la-Bains.	Bagnères de Luchon.	Cal. Paso Robles, No. 1.	Cal. Paso Robles, No. 2.	Cal. White Sulphur, No. 6.	Cal. White Sulphur, No. 7.	Cal. White Sulphur, No. 2.
Carb. soda.....	40			51	5			
Carb. magnesia....	8	2		1	8	1	4	1
Carb. lime.....	10	9				2	6	1
Carb. iron.....	1	1						
Sulph. soda.....	17	6	1	8	41	11	13	9
Sulph. magnesia...		2						
Sulph. lime.....		1	2	3	18	2	1	2
Sulph. potash.....	10		1	1	*			
Sulph. alumina....		3	4					
Sulphuret sodium..			3					
Chloride sodium...	162	1		27	96	23	14	22
Chloride calcium..						1	1	1
Chlor. magnesium		1				1	1	1
Total solids.....	252	25	14	93	168	43	40	36
Carbonic acid.....		3		18	84			
Sulph. hydrogen...		7		230	230	4	*	6
Temperature	131°	108°	131°	100°	122°	86°	69°	89°

The carbonates of soda and magnesia in Paso Robles Spring No. 1 are double.

Aix-la-Chapelle is noted for the cure of chronic rheumatism and diseases of the skin; Aix-le-Bains for chronic rheumatism, diseases of the skin, syphilitic complaints, and paralysis; and Bagnères de Luchon for scrofulous and syphilitic affections, pustulous eczema, psoriasis, pityriasis, ichthyosis, rheumatism, and old wounds.

There are traces of iodine and bromine in Paso Robles (No. 2, the "Mud Spring"), and they give that spring a superiority for diseases and rheumatism resulting from them, of any yet analyzed in California. The White Sulphur (No. 2) has six cubic inches of sulphuretted hydrogen in a gallon; No. 6 has four inches, and No. 7 a trace. These waters are good for skin diseases.

The Thermal Springs of California form a distinct feature in her geological history, and are remarkable for their number and variability of properties as well as constituents. Space forbids more than a mere allusion to the more celebrated, I mean the "Geysers," situated in Sonora County, in the midst of the Coast Range, fifty miles from Petaluma, in a gorge known as "Pluton Cañon." The spot is wildly picturesque, being in the vicinity of some of the highest peaks of the Coast Range. The springs, which extend for nearly a quarter of a mile, in the middle of the cañon, cover about 200 acres. They are elevated 1700 feet above the level of the sea, and are surrounded by

mountains from 8000 to 4000 feet high. This cañon has evidently once been the theatre of intense volcanic action, the rocks being burnt into a great variety of colors.

There are over 800 springs and jets of steam in this cañon, from an inch to several feet in diameter, the depositions from which vary from snowy white to inky black in color. The water contains iron, sulphur, and the various salts of lime, magnesia, ammonia, soda, and potash, emitting the characteristic odor generated by hydrosulphuric acid. The registry at the hotel kept here is written with the dark-colored contents of one of these springs. The rocks over which the waters from these springs flow are coated with the compounds of sulphur, lime, and magnesia. Epsom salts, alum, sulphur, and sulphate of iron can be collected here by the wagon-load.

The two greatest attractions in the cañon are the "Witches' Cauldron" and the Steamboat Spring. The former consists of a cavity about seven feet in diameter, and of unknown depth, filled with a black viscid fluid, which, boiling with intense energy at a temperature of 200° F., bubbles and splashes, rising occasionally two or three feet above the sides of the Cauldron, though never running over it. The rocks for several feet above this "infernal fountain," over which its contents have splashed, are covered with innumerable crystals and stalactites of sulphur. The dark color in the spring is caused by the water holding iron in solution having through contact with other water containing sulphuretted hydrogen formed a new compound, whereby the latter has been set free—hence the fetid odor. The Steamboat Spring, situated only a few yards from the Cauldron, consists of an opening in the rocks at the bottom of the cañon, about two feet in diameter, through which is constantly ejected, with the noise of a number of steamers, a body of steam sufficient, could it be controlled, to propel a large amount of machinery. This steam is so hot as to be invisible for five or six feet above the aperture through which it issues. On a clear day it rises in a column to a height of more than 800 feet. The earth in the vicinity of the largest of these springs is hot and full of sulphurous vapors, which constantly escape from the surface. The ground, for some distance around, shakes and trembles, and the visitor, by stamping his foot, causes a terrible noise to resound through the cavernous places below. If he steps out of the beaten track, or thrusts his cane through the thin crust that has hardened on the surface, hot, sulphurous steam escapes from the aperture.

The noise of so many steam vents, each blowing off in a different key, and at irregular intervals, produces a most discordant din. Some of these sounds are subdued and gentle, scarcely louder than the breathings of a horse after a severe run; some resemble a low growl, emitted at intervals of about a minute, while others can scarcely be distinguished from the puffing of a high-pressure engine. With all these noises above the surface of the earth and below, the loathsome smell of sulphuretted hydrogen, and the tremulous motion of the ground beneath one's feet, a feeling of insecurity inevitably impresses itself upon the minds of those who visit the place for the first time.

Among the many singular things to be seen in this strange cañon are hot and cold water issuing from springs but a few feet apart, and in other places water issuing from the same orifice, and apparently from the same source, but

differing essentially in color, taste, smell, and chemical composition. The water of Pluton Creek, which, when it enters the cañon, is at a low temperature, becomes heated to about 140° in its passage through it. Stimulated by the unusual warmth of the place, vegetation is at all times vigorous, even about the margins of the steaming pools. In the water of some of these springs, boiling at 200°, and in others where the water is sufficiently acid to burn leather readily into tinder, *algæ* and *confervæ* find a congenial element and grow abundantly. Less than forty paces from the focus of this heated region trees, shrubs, grass, and flowers grow with luxuriance, both in winter and summer.

PART III.—MANUFACTURES.

The manufactories of the State are almost altogether established in San Francisco, whose merits as a manufacturing centre are unquestionable. Taking everything into consideration, San Francisco may justly claim rank among the first manufacturing cities of the United States. The advance of its industrial interests has been as rapid as their status is creditable, and justifies the most sanguine hopes entertained of its future.

Being the point to which the steamship lines of China, Japan, Australia, New Zealand, Panama, the North Pacific and Hawaiian Islands converge, and also the common terminus of the great railroads traversing the continent and intersecting the different Western States and Territories, its position admits the raw material necessary for the various manufactories to be cheaply and readily conveyed to it. Its favored position also gives it in the West, in a commercial sense, the combined advantages of New York and Chicago in the East, and permanently establishes it as the chief commercial city on the Pacific Coast.

In this part of the report I have thought proper to treat of manufactured and cultivated products, as might be interesting to the trade, under one division, arranging them simply in alphabetical order.

Acids and Chemicals.—There are six chemical works in San Francisco, with an aggregate force of seventy-two men employed. Of nitrate of soda there are 1800 tons used annually; of sulphur, 2300 tons; and of sulphuric and nitric acids, 400 tons. Capital invested amounts to \$350,000; value of crude material is \$140,000; amount paid in wages annually, \$60,000, resulting in products to the value of \$700,000.

Acetic Acid.—Attempts have been made to manufacture this acid, but the enterprise seems to have been abandoned. With so large a quantity of vinegar as is made annually in this State, and soda so abundant and cheap, it seems remarkable that a chemical so much used should be imported in so large quantities. The manufacture of

Nitric, muriatic, and sulphuric acids is carried on largely in San Francisco, and has long been a leading industry. The oldest institution for the manufacture of acids is the San Francisco Chemical Works, established in 1854, and owned by G. E. Judson and J. L. N. Shephard, who have two factories, —one in Oakland (the Brooklyn of San Francisco) and one in this city. In these two manufactories the three leading “mineral acids” are made, the

nitric acid being put up in carboys containing 128 pounds, the muriatic 100 pounds, and the sulphuric 160 pounds each. They also make refined sulphur, and use in the course of their business immense quantities of crude sulphur, common salt, sal soda, nitrate of soda, etc.

Another manufactory, turning out a large quantity of the above acids, is the Golden City Chemical Works of this city. They make nitric, muriatic, and sulphuric acids, their works having a capacity claimed of 20,000 pounds a day. They have a contract for supplying the acids used by the United States Mint located in San Francisco and the San Francisco Gold and Silver Refinery. In consideration of the local houses supplying the market, the importation of these acids has been reduced to a minimum.

Bluestone.—Some eight or ten years since a leading house here engaged in the manufacture of this chemical, but was forced to abandon the project from the low rates produced from the importations of foreign make. In 1876 the enterprise was abandoned, and in 1877, 909 casks, and in 1878, 982 casks of bluestone were imported.

Cream Tartar.—There are in San Francisco five mills which together with other business grind the imported crystals of cream tartar, turning out a very fair article. It is used for home consumption, the manufacture of baking powders, etc. It would seem that a great wine-producing State like California should furnish its own argols and not be under the necessity of importing.

Ammonia.—Some few years since the San Francisco Gas Works engaged in the manufacture of carbonate and liq. ammonia, using for that purpose the refuse or gas liquor, such as is produced in great quantities in all gas works. The article made by Eastern chemical works finds the most favor among the trade, however.

Soda.—During the last three years systematic efforts have been made to utilize the vast alkaline deposits of California and Nevada, and the Pacific Soda Company, who own 180 acres in Churchill County, Nevada, and a manufactory in San Francisco, turn out large quantities of sal soda, soda ash, yeast powder, washing powder, saleratus, bicarbonate of soda, etc.

The prejudice in favor of the foreign soda compounds is not entirely overcome, but so inexhaustible is the supply of crude material to be obtained that it is only a question of time, coupled with ordinary energy and skill, for the California article to not only supply all local demands but figure in our list of exports. The Pacific Soda Company have a capital of \$25,000 invested and have largely increased their facilities, and now manufacture 30 tons of bicarb. soda, 100 tons soda crystals per month, and are receiving 150 tons carbonate of soda every 30 days, besides having at their works in Nevada 2000 tons in stock ready for shipment. The soap manufacturers on this coast are now purchasing this soda as it comes from the mines, using it pure, as it is found to answer all the purposes of the English soda ash and soda crystals, and is much cheaper. H. G. Hanks, of this city, has made a careful examination of the products of the Pacific Soda Company, and states the bicarbonate of soda to be fully equal in strength and purity to the best English bicarbonate, and the carbonate of soda to contain 54 per cent. of alkali. There is

no reason why these products should not take the place of imported carbonated alkalies for all technical purposes.

One of the effects of the discovery and utilization of the "alkali deposits" is that within the last three years the price of soda ash was reduced from 4.27 cents to 2 cents, and soda crystals from $3\frac{1}{2}$ cents to $1\frac{1}{2}$ cents.

Alcohol.—There were three distilleries in San Francisco, employing 60 men, manufacturing 1,416,513 gallons of proof spirits (1875), valued at \$1,850,850. In 1871 400,000 gallons of alcohol were made in California, and in 1870 1,200,000 gallons of proof spirits (neutral spirits). About one-half of the alcohol was properly rectified, the balance being suited for the manufacture of paints and varnishes, retaining much of the smell and taint of fusel oil. The "neutral spirits" are used mostly by "liquor mixers," and are seldom much above proof.

The manufacture of California spirits, however, run against the snag of Eastern competition, and the following figures serve to show the gradual decline of the industry. There were made in San Francisco during the last four years of spirits:

In 1875, . . . 1,416,513 gallons	In 1877, . . . 227,332 gallons
In 1876, . . . 998,116 "	In 1878, . . . 64,604 "

The imports of Eastern spirits were in the years

1875, . . . 8,016 barrels	1877, . . . 11,751 barrels
1876, . . . 8,881 "	1878, . . . 15,711 "

The increase in the imports of Eastern spirits has been contemporaneous with the decline and destruction of the manufacture in California, which may be now considered at an end. Of that manufactured in San Francisco during the past two years not a gallon found its way into general trade, it being used altogether for making yeast.

Antimony.—Many of the ores treated in California contain antimony in varying quantities, which is frequently saved as a by-product in their reduction. In 1876 over 25,000 pounds of this metal was sent by rail to New York. Large quantities can and doubtless will be saved from our complex ores in future years, and add another important item to our list of home products.

Artificial Stone.—Artificial stone is one of the many marvels of the age. The art of manufacturing this exceedingly useful article is yet in its infancy, and the best yet may be deemed as far behind what is to come, as was the first printed book, and the types and press used in it, beside the wonderful machines and typographical wonders of the present day.

In 1877 there were in San Francisco four establishments engaged in the manufacture of artificial stone, employing 25 men, with an annual product valued at \$125,000. The Eureka Stone Company of this city have obtained a patent for a new process which they claim to be the equal if not the superior of any in use. During the last Mechanics' Fair in this city they made a

very interesting exhibit, which attracted a great deal of attention. Their stone is made of native materials, California sand being the basis. It is made into large blocks suitable for building purposes, in steps, pavements, and handsome cemetery work. In addition to the moulded stone the company covers the fronts of buildings with its stone cement in the manner of ordinary plaster. The products of this company have been in use some years in San Francisco, and bear the test of our moist, trying climate with satisfaction to those interested.

Bags.—These important articles were all imported until the past few years. California uses such vast quantities of bags and bagging material that the business has assumed gigantic proportions, supporting five wholesale establishments, who handle what is imported, as well as many engaged in selling from first hands, and quite a number of manufacturing establishments. The imports for the past few years have been as follows :

In 1876 from Great Britain 6,600,000; from Calcutta 5,800,000 bags (all sizes). From Great Britain 8,700,000; from Calcutta 235,000 pieces burlap. In 1874 there were imported 16,052,883; in 1875 12,550,000; in 1876 12,835,000; in 1877 10,625,000; and in 1878 18,666,000 bags and pieces burlap.

This is one of the articles liable to "corners," although since the establishment of the Pacific Jute Company the market has been more regularly supplied. This company manufactured in 1876 4,000,000 grain bags, 150,000 wool bags, and 500 bales of twine, this being about their then capacity.

In 1878 (the works having been enlarged) they turned out 6,000,000 grain sacks (22 by 36), besides a large quantity of wool bags, barley bags, hop cloth, burlaps, fleece twine, and yarn, their goods meeting with a growing recognition of intrinsic strength, evenness of size, and bright color.

The prices at the beginning of 1879 were, for 22 by 36, imported bags, 8½ cents; spot goods, 9½ cents for May delivery; 8½ cents for wheat bags; wool sacks, 47½ and 52 cents for 3½ and 4 pound; gunnies, 18 and 18½ cents; burlaps, 7½ and 7¾ cents for 40 inch, and 7½ cents 45 inch; hop bagging, 22 ounces, 16 cents; 24 ounces, 18 cents; flour bags, 5½ and 6 cents for quarters, and 8 and 10½ cents for halves; Eastern cotton bags, quarter bleached, 6½ cents; do. unbleached, 6½ cents; do. halves, 10½ cents; Eastern paper bags, quarters, 4 cents; eighths, 2½ cents; sixteenths, \$1 70 per 100.

Barrels.—There were in 1878 four manufactories of barrels in San Francisco, employing 275 men, and turning out for the year 267,250 independent of the sugar refineries, where 58,000 were made by their own hands, the necessary machinery work being done from the same steam power used to run the apparatus for the manufacture of sugar and syrup. There were also 58,000 syrup kegs made by other factories. The wine-making interest requires large quantities of kegs, barrels, pipes, puncheons, and tanks, which are mostly manufactured in San Francisco.

Borax.—Of this important manufactured article there has been received in San Francisco (of local production) during the last five years in pounds:

1874.	1875.	1876.	1877.	1878.
5,000,000	5,433,658	5,143,000	3,539,800	2,668,000

The following is a description of the first treatment of the crude or native "borax" (ulexite, principally) at the works near Columbia in Esmeralda County, Nevada, which may be considered a typical process. The crude material or "stuff," as it is known at the fields, is shovelled into large tight vats capable of holding from three to five thousand gallons, and sufficient water being added the whole is boiled together by a direct current of steam until the solution marks from 22° to 26° Baumé, when the liquid is allowed to settle for some hours. It is then run off through rubber hose into large lead-lined tanks to crystallize. The crystallization is complete in from ten to thirty days, the time required depending upon the season. The mother liquor is then drawn off and the borax, which is often highly colored, is chipped off the sides of the tanks and placed upon a wooden platform to dry.

The portion that has crystallized upon the bottom being quite dirty and dark-colored is worked over with the next batch. The product of the above process is put in sacks containing 200 pounds each, and sent as "concentrated borax" chiefly to the San Francisco refineries, where it is submitted to further and repeated solution and crystallization, when it assumes the form of the familiar borax of commerce.

In San Francisco there are three establishments devoted to the refining of the "concentrated borax," employing 115 men, producing, annually, borax to the value of \$680,000. These establishments represent in outlay a capital of \$150,000, use about \$225,000 of crude material, and disburse, in wages to employés, the sum of \$12,000 per annum.

Breweries.—Notwithstanding our list of imports shows a large quantity of Eastern and foreign-made beers, ales, stout, etc., the business of brewing flourishes in California, there being in the State no less than 150 breweries, and in the city of San Francisco 89. The city establishments produced, in 1878, 250,000 barrels, valued at \$2,000,000. Number of men employed 500. The malt is made wholly from California barley, while most of the hops used are also of home growth. Experience has fully demonstrated that beers and other malt liquors can be made in this State of a quality equal in every way to the imported article, while the coolness of the climate (particularly in San Francisco) admits of brewing being carried on throughout the year. Barley is always a certain and abundant crop in California, the total receipt of this grain for 1878 being 1,571,954 pounds.

Candles.—Ever since the business of underground mining began to be extensively practiced the consumption of candles has been large in the State. For 12 or 15 years the quantities used on this coast have been enormous, reaching to 175,000 boxes in 1864, and increasing to 250,000 in 1867, and greatly exceeding this quantity in later years. The testimony of miners and others seems to be that the California-made article is superior to the imported. There are 6 manufactories of the article in San Francisco, employing 175 men, and producing, in 1878, somewhat over 200,000 boxes, valued at \$570,000. The following is the trade price list of candles for 1878:

Grass & Co.'s stearic acid, 14 ounces, 14 cents. Thayer & Judd's paraffin, 20½ cents. Leonard's sperm, 29 cents; do., wax, 39 cents. F. Dorr & Co.'s 12 ounces, adamantine, 11 cents. Proctor & Gamble's, 12 ounces, star, 12 cents;

do., 14 ounces star, 14 cents; do., stearic acid, 16 ounces, 19½ cents; do., 14 ounces, 17½ cents; do., miner's wax, 14 ounces, 17½ cents; do., coach, 25 cents. Wood & Conoham's globe, 12 ounces, 11½ cents. W. H. Wood & Co.'s solar wax, 17½ cents; do., shield, 14 ounces, 15 cents. Grant's stearic acid, 14 ounce, 14 cents. Mitchell's 14 ounces, 17 cents; do., 16 ounce, 19 cents. U. S. light weight, 9½ cents. Harkness's wax, 19½ cents; do., stearic acid, 14½ and 15 cents; do., solar, 11½ and 12 cents. Werk's stearic acid, 16 ounces, half box, 18½ cents; do., whole box, 18 cents; do., 14 ounces, half box, 16½ cents; do., white, 15 cents; do., adamantine, 12 ounces, 10½ cents; do., 14 ounces, 12½ cents. Shaeffer's stearic acid, 14 ounces, 16 cents; do., 12 ounces, 12 cents. Jenell & Harrison's adamantine, 12 ounces, —. Scheider's 12 ounces, 12 cents; do., adamantine mining, 14 cents; do., stearic wax, 16 cents; daylight, 13 cents. Belmont imperial wax, 20-pound boxes, 16½ cents; do., stearic acid, 18½ cents. San Francisco crystal wax, 14 ounces, 16½ cents; do., stearic acid, 14 cents; do., star, 18½ cents. Judson's eagle, 12 ounces, 12 cents. Hoffman's adamantine, 12 ounces, 11 cents; do., extra adamantine, 10½ cents. Roper's extra stearic acid and bay improved, 16½ and 17 cents; do., solar, 11½ cents.

Coffee and Spice Mills.—There are 15 establishments in San Francisco for grinding and putting up coffee, spices, etc. Number of men employed, 124; coffee roasted and ground annually, 8,130,000 pounds; chocolate made, 800,000 pounds; spices ground, 98,400 pounds; value of products, \$1,327,000.

The local mills supply fully the grocers and druggists, and comparatively little of the manufactured articles are imported.

Chicory.—Chicory grows so luxuriantly, and with so little cost in California, that two factories were established in 1868 in San Francisco for roasting, grinding, and preparing the root, partly for export and partly for home consumption.

This mixing ingredient can scarcely be called an adulteration, for the taste of Europe and America demands it as an improvement. It modifies the bitter taste of coffee, and serves as a correcting aperient against the astringency that belongs to coffee. Fifty tons of chicory are produced to the acre in Yolo County.

Glassware.—The demand for bottles, vials, and the coarser kinds of glassware was for many years limited in California. With the growth of the wine interest, however, the manufacture of chemicals and patent medicines, the bottling of mineral waters, and the rapid increase in the business of preserving of fruits, meats, and vegetables, the demand for vessels suitable for these purposes has become very large. To meet these extensive and growing requirements, two glass factories were established in San Francisco, one of which, unfortunately, was destroyed by fire and not renewed, or, more properly, the two companies then combined under the name of the San Francisco and Pacific Glass Works.

The Pacific Glass Works were erected in 1862, producing, in 1866, \$72,000 worth of ware, and in 1867, \$130,000. The present company give employment to 125 men, run 17 furnaces, and 8 melting pots, manufacturing in 1877 ware to the value of \$300,000. The white sand required for making the finer

qualities of glass is procured from Monterey County, where it exists in large quantities; the next grade comes from Oakland, Alameda County, while that used in making coarser wares is obtained from the hills about San Francisco.

The San Francisco and Pacific Glass Works now manufacture in quantities, to supply the coast, wine and liquor bottles, demijohns, carboys, patent medicine bottles, mineral water bottles, patent fruit jars, and Newman's patent boxed demijohns. In the past few years they have incorporated with a capital stock of \$1,000,000, and reduced the rates of their goods with a view to overcome importations.

In 1877 there was manufactured at this establishment \$150,000 of ware; after numerous experiments succeeding in making a fair article of flintware, although not of the quality turned out by the Eastern manufactories, who continue to supply the trade on this coast with the finer goods of prescription ware. In 1878 the Pacific Company made 800,000 self-sealing fruit jars to supply the demand.

Besides the above works, there is an establishment in the city engaged in making mirrors from French plate glass, about 1500 large-sized pieces being manufactured annually. Mirrors are also resilvered here when arriving in a damaged condition from the chances of a sea-voyage.

The business of cutting, grinding, and polishing glass is also well represented in San Francisco by the establishment of John Mallon, who has carried it on successfully here for the last 18 years.

Glue.—The largest establishment in the State engaged in making this article is the Pacific Glue Company, at San Francisco, which for several years past has produced enough to serve not only home wants but a considerable surplus for exportation, thus furnishing another example of the manner in which California has been able to send her products and wares to the very markets whence, but a few years since, she drew her supplies. The factory above mentioned employs 30 men, turning out 260 tons of glue, of neatsfoot oil 4000 gallons annually, and of curled hair 18,000 pounds, all valued at \$227,000.

It will be noted that neatsfoot oil is also made at this establishment, the materials for this purpose, as well also as the parings of skins and other parts of animals required for making glue, being abundant in California. Notwithstanding various and persistent attempts to find a substitute for filling mattresses, curled hair meets the requirement better than any other substance.

Honey.—No bees were found in California at an early day. But so great has been their increase since their introduction, some twenty years since, that honey is now abundant and cheap.

The bee can only be profitably raised under certain conditions. They must be near a river or moist lowland. In the great plains many of them perish in the dried-up fields after the first months of spring, requiring all the honey made to keep them alive and in health.

The banks of the Sacramento River are lined with willows and wild flowers, which afford the bee rich pasturage in March, April, and May. Then follows a period of six weeks in which there is not sustenance enough in the

fields to support him, and he must draw from the honey in the hive. From early July to October the bee finds good support from the honey dew found upon the leaves of the cottonwood and exudation from a species of aphid. Honey made from this dew is coarse and unfit for market, and is reserved for bee feed. In autumn there comes, in many localities, a new variety of flower pasture, and the "creasote bush," named from its odor, is an annual that supplies bee feed for six weeks in September and October, making very white honey. The wild buckwheat affords good autumn pasture, and wild mustard supplies food in the spring.

Cephalanthus, manzanita, madrona, wild azalea, sweet alyssum, alfilerilla, cloves, and wild mint supply pasture for the bee. But best of all is the wild sage of the mountains, which flowers from April to June.

The honey of California is distinguished for its great body, but differs materially according to the locality and the predominant flowers at the time of its production. The yield of honey to the bee in California is double that made usually in the Atlantic States. Bees consume here much more of their stock in summer than in winter for sustenance, and though they require so much less honey for support in this country, they work and store all the same.

San Diego and San Luis Obispo counties are noted bee districts, and turn out astonishing quantities of honey, both strained and comb. In good seasons it is quite common to gather 100 pounds of honey (comb) from a hive. First-rate strained honey sells in the San Francisco market in comb at 10 and 12½ cents. Strained at 6 to 8 cents.

Of honey there was received in San Francisco in

1876.	1877.	1878.
8,255,000 lbs.	651,000 lbs.	8,000,000 lbs., estimated.

Large shipments of comb and strained are made to the Eastern States, and England is becoming a large consumer of our strained honey.

Hops.—The following article from the pen of Mr. John Calvert, of San Francisco, written in 1870, will doubtless prove interesting:

Hops have been cultivated in California for fourteen or fifteen years. Within the last four years the production has been very largely increased, and to such an extent as to overstock the local market and to reduce the price to the bare cost of production. Hops can be grown in almost any part of the State, the climate and soil being admirably adapted to their cultivation, but the bulk of those sent to market are produced at San Jose, Sacramento, Marysville, and Los Angeles.

The annual production of the State is estimated at 4500 bales of 200 pounds each, nearly all of which are consumed here. There are imported from the Eastern States about 1500 bales for local consumption, some of the brewers contending that the native article does not possess the requisite degree of flavor or aroma, although being superior to any imported in point of strength. Those grown near Los Angeles are observed to possess a more delicate flavor than any others grown in California, whilst the San Jose district produces an article containing more extractive matter. The brewers are in the habit of

mixing the California hops with about one-third of Eastern, partly to modify the strength, partly for the aroma, and also to obviate some difficulty in fermentation which is observed when the native hops are used altogether.

The present value of new California hops is from fifteen to eighteen cents per pound, while the remains of last year's crop are not worth more than ten cents. The San Francisco merchants have been endeavoring to find a market for the surplus product, but without much success. The crops in the Eastern States and in Europe have been large for several years, and there appears to be no outlet for them at present. Small shipments have been made to Australia—about 200 bales per annum—and also to New York and England, where the consumers pronounced them to be of very excellent quality. The average yield per acre in California is about 2000 pounds, while in the State of New York it is but 500 pounds. California hops being carefully cured are quite equal for the use of the pharmacist to any imported. The following is the method adopted for their cultivation and curing for the market by Mr. W. W. Coe, of San Jose, which I understand differs but slightly from that in use in other countries:

Mr. Coe has about sixty acres under cultivation. The roots are set out in the spring (from January to April) in hills ten feet apart, and covered with soil to a depth of two to three inches, three roots being planted in each hill. A pole about nine feet in height is placed in the centre of the hill, and for every twenty-five hills a very long pole for a male plant, for fertilizing the female plants upon the other poles. On account of the high winds prevailing the poles are connected by fours, by means of thin poles or cords, and the vines are carefully trained on the poles and the cross-lines or pieces. The soil preferred is a light, clayey loam, which requires deep ploughing and careful cultivation. The roots selected for planting are cuttings of the first year's growth. The old roots are trimmed and cut around in the spring, and will last about fifteen years, but continue to improve for nine or ten years.

Picking commences at San Jose about the first of September; but in some districts, as at Sacramento, about six weeks earlier. When picked they are taken to a building heated by means of hot air, and exposed to a temperature of about 145° for about ten hours, when they are removed to the cooling rooms. When sufficiently cool they are placed in a detached building, and allowed to sweat for about two weeks, or longer if necessary. They are then baled and sent to market.

The process of sulphurization, so much practiced in Europe, for improving the appearance of old or damaged hops, has not been found necessary here, owing to the care taken in curing them, and the entire absence of blight or parasitical insects. Receipts of hops for the year 1876 were 18,835 bales, and for 1877, 14,105 bales.

Lead.—Receipts at San Francisco of lead were, for 1876, 4,194,800 pounds; 1877, 2,942,700 pounds, and 1878, 8,669,700 pounds. The only establishment for manufacturing this metal into the various forms required in commerce is that of Selby & Co, San Francisco, established in 1865. In 1878, 100 men were employed, making, not only shot of every description (400 tons), but also minie balls, sheet lead (2100 tons), lead pipe, etc, turning out products to the value of \$400,000.

Macaroni.—Several firms in San Francisco manufacture macaroni and various Italian pastes, partly for home consumption and partly for export. In 1876 there were a million pounds manufactured, valued at \$100,000. In 1877, 72,000 fifteen-pound boxes, at a value of \$90,000. In 1878, 1,200,000 pounds, valued at \$108,000.

Malt.—In San Francisco there are five malt houses, employing 45 men, working up 1400 tons of grain, and producing malt to the value of \$329,900. The product of this manufacture goes entirely to the breweries.

Matches.—A few years ago all our matches were imported. Now California exports several thousand gross annually, besides manufacturing enough to meet the home demand. Those made here are mostly of the style known as "block matches," the timber used being exclusively Port Oxford cedar, which, besides splitting easily, is a light and inflammable wood. In San Francisco there are eight match factories, employing 114 men, turning out 800,000 gross annually, valued at \$290,000. Quotations for 1878 were, block, in 100 gross lots, \$1.80; telegraph, do., \$1.90; Swift & Courtney's (Eastern), \$2.70, 100 gross lots.

Oils.—There are several establishments in San Francisco devoted to the oil business in its various branches. One establishment has large works erected with a view of the pressing out and clarification of linseed, mustard oils, etc.

Abietine —This hydrocarbon is classed in the trade, like turpentine, among the oils. It is of California production, and is distilled from the viscid terebinthinate juice of the *Pinus sabiniana*, which occurs plentifully in the foothills and lower elevations of the Sierra Nevada. Like turpentine, etc., it is put up in five-gallon tin cans, selling in the San Francisco market for \$3.00 per gallon. From its remarkable solvent powers it is put up by divers druggists as a cleansing fluid, under the names of "*Aurantine*," "*Abietine*," "*Theoline*," etc., for removing stains, spots, etc., from gloves, ribbons, wearing apparel, etc. It has been critically examined by Mr. Wm. T. Wenzell, of San Francisco, who published some years since the results of his observations in the "*American Journal of Pharmacy*."

Alaska Cod-liver Oil.—The cod fisheries of the North Pacific yield this oil, some considerable quantities of which at times are brought into San Francisco, selling there readily at \$1.00 per gallon by the barrel. It is of a deep nut-brown color (though not so dark as the Norway brown oil), and a characteristic fishy, though not a nauseous taste. It has been prescribed by our local practitioners to some considerable extent, and seems to meet the requirements of a good oil, not disturbing the digestion to the extent of the more acrid dark-brown oils known to the Eastern trade. It has never, I believe, been chemically examined.

Castor Oil.—The following on California-made castor oil is taken from a paper contributed by Mr. G. G. Burnett, of San Francisco, to the annual meeting of the California Pharmaceutical Society, held in October, 1871:

The *Ricinus communis*, or castor oil plant, has been cultivated for the last fifteen or sixteen years in the middle or lower counties of this State. Yuba, Santa Barbara, and Los Angeles counties are the principal localities in which

it is at present cultivated, though in many of the intervening counties it is raised in small quantities. In Marysville, Yuba County, it is planted in rich, black, alluvial soil, but in the southern counties it is raised in the sandy and adobe soils which there abound; and in both localities, and in either soil, the plant flourishes with great vigor and strength. The plant is an annual, growing rapidly and luxuriantly, attaining a height of from eight to twelve feet. The seeds should be sown about the last of March, three or four seeds in a hill, which after attaining a height of three or four inches should be separated, leaving but one plant in each hill, and in rows of five to six feet apart. Four and a half to five pounds of seed are required for each acre. The soil should be kept free from weeds, and loosened around the roots to prevent baking or becoming hard. The beans, as they approach maturity, in the months of August and September, should be examined each day, and the withered and dark-colored ones removed to prevent disease infecting the rest, as well as to keep the oil after expression from being dark and difficult to bleach.

The spikes containing the beans should be collected before becoming too ripe, and spread on a smooth plat of ground to permit the sun to dry and crack them open, when they eject the beans with considerable force. They are then gathered and cleaned by means of a common fanning machine. The beans are black, with dotted grayish lines traversing them longitudinally, ovate in form, three-quarters of an inch in length by three-eighths of an inch in width and one-quarter of an inch in thickness, with a smooth, hard coat, covering a white interior. They should be converted into oil as soon as possible after gathering, as in a few weeks they become rancid, yielding an oil with irritating properties. The method of obtaining the oil upon this coast is an exceedingly simple one, being entirely by cold expression.

The beans are first finely ground, and subjected to strong pressure by means of a circular screw press, which is usually from six to eight feet high by two or three feet in diameter, with open slat sides, through which the oil is forced as the mass is compressed. The oil as thus expressed presents a thick, white, milky appearance, and is ready for clarification. This process varies with different manufacturers. At the San Francisco Oil Works it is rendered clear by steam heat, which causes the deposition of the extraneous matter, but in Marysville and Los Angeles it is clarified by means of solar heat. Tanks of tin are provided, which may be of any convenient size, usually some fourteen feet long by four feet wide and two feet deep, screened in some instances with a glass cover to prevent the settling of dust on the surface of the oil. These are filled with the milky expressed product of the press and exposed to the rays of the sun, which settles the foreign matter, leaving about six inches of clear oil on the top during the course of the day, which at nightfall is carefully drained off by means of stop-cocks in the sides of the tanks. These are again filled with the oil, and the process repeated each day. The oil clarified by steam heat is straw-colored, of a slightly greenish hue. That obtained by solar heat is lighter colored, almost transparent, and of superior clearness, although from the difficulty of regulating the solar heat as applied the various samples examined presented several shades of color and brightness. All, however, were superior to the oils imported in bulk, and in no particular inferior to the finest English imported oils.

Our market has heretofore been chiefly supplied with the East Indian and Baker's oils. The former is thicker and muddier than our native oil, depositing quite a heavy sediment of an albuminous character in the bottom of the cans in which they are imported. The Baker's oil is of a deeper straw color than our San Francisco oil, and has been the best offered in the market of the imported oil in bulk. The English oil has ranked the highest, but owing to its high price has met but light demand, and now that our California oil very nearly, if not quite equals it, its importation will probably cease altogether.

The California oils are perfectly soluble in alcohol; miscible with the fixed and essential oils; free from acidity or acridity; have a dense, heavy, slightly sweetish taste, and are fully able to meet all the requirements desired in a pure castor oil. The English process of treating the oils to render them "tasteless and odorless," is by filtration through charcoal and solar heat; and our California oils, subjected to the same process, yield beautiful, clear white oil, devoid of color, and as "tasteless" as can be made.

The sp. gr. of our native production is between 94 and 96, which is fully equal to the imported oils. The consumption of oil on this coast has been variously estimated at from 20,000 to 25,000 gallons; probably the higher figure is nearest the actual amount consumed. During 1868 and 1869 the demand reached some 12,000 gallons, and 1870 nearly double, or nearly 24,000 gallons were required to fill home consumption; the present year (1871) will doubtless require considerable of an increase on the preceding. The quantity produced last year from all sources was about 10,000 gallons. The San Francisco Oil Works expect to produce the present year about 15,000 gallons; and others in Marysville about 8000 gallons, and those in Santa Barbara some 4000 gallons more, or in the aggregate 27,000 gallons. This quantity, though appearing large, will probably not be more than sufficient to supply our home demand. Last year we produced less than half the amount consumed. The present year we will manufacture sufficient to supply our home trade, with possibly a light surplus besides. In subsequent years the product will vastly increase, and must assume such proportions that our home demand will require but a fraction of the quantity manufactured, and will prove to be a most valuable and important article of export.

The agents' rate for the best imported castor oil has been \$2.25 a gallon. Our California oils have been rated at a less figure to induce their introduction, and have been supplying our market, so far as the supply would permit. No. 1 oil is purchased at present at \$2 per gallon, and can be made and placed in market at \$1 per gallon, affording a handsome profit to the producer at even this low figure. The average yield per acre is about 1400 pounds of the beans. These will yield from 25 to 33 per cent of oil, and some of the beans in favored localities have been made to yield as high as 40 per cent. of oil. Take the average, however, of 30 per cent., which we are assured California beans will produce, and we have a yield of between 35 and 40 gallons to the acre, which, at the present or prospective rates, is a most remunerative crop to raise.

I append "trade notes" concerning castor oil: 1875. The markets have been subjected to considerable fluctuation during the year, in consequence of the competition between Eastern oil and that produced by the Pacific Oil and

Lead Works. At the beginning of the year the price of Baker A A, the principal Eastern brand for sale here, was \$1.45, and that of California \$1.12½ for No. 2, and \$1.25 for No. 1. Imports of Eastern caused a further reduction of California to \$1.05 for No. 2, and \$1.15 for No. 1, while Baker's fell to \$1.15.

Kerosene.—Notwithstanding the fact that California kerosene, as stated elsewhere in this report, suffers in the estimation of the trade in comparison with the Eastern article, a certain amount is being continually produced, and finds its way to the San Francisco market. In 1877 about 2500 barrels were received, and in 1878 over 4500 barrels.

Linseed Oil.—The flax plant not only grows wild to a considerable extent in California, but is easily cultivated, it being common to obtain a yield of 1500 pounds of seed to the acre.

The Pacific Oil and Lead Works, started in San Francisco in 1866, and the first and only establishment of the kind in the State, manufacture linseed oil, oil cake, and also expressed oil from the castor bean, mustard, sunflower, rape, and other seed. They employ 50 men and have a capacity of producing annually 800,000 gallons of oil. These works supply so fully the demands of the market that very little is imported.

Mustard-seed Oil.—The mustard plant thrives in California, and grows in such profusion that it becomes a pest to the wheat-fields, especially in our coast valleys, as for instance, from Alameda south to the Santa Cruz and Pajaro basins. It stubbornly resists extinction, and so grows and overtops the grain with its yellow flowers that a stranger might readily mistake it for the crop intended to be raised. A small quantity has always been gathered here for table use, it being of excellent quality, but of late years it is found to make an excellent oil adapted even to the uses for which olive oil is applied. It is gathered by Chinamen, who thresh and bring the seed to the oil-mill in San Francisco where they dispose of it at two to three cents per pound. Many who have made trial of it prefer this oil to that made from lard or the olive for cooking purposes, it also holding out against rancidity longer than the latter. It is also extensively used to adulterate olive oil, if the addition of an equally good or better article can be called an adulteration, the only object in so employing it being its greater cheapness.

Mustard-seed oil is sold in the San Francisco market at \$1.00 per gallon in five-gallon cans; \$1.12½ per gallon in two and a half-gallon cans, and \$1.25 per gallon in one-gallon cans.

Oolacon Oil.—Vast shoals of a small fat fish abound in the waters that lave the coasts of Alaska and British Columbia. So countless are their numbers that it is no uncommon sight in certain seasons of the year for the beaches to be covered with them for miles, they seeming to be chased shoreward by large fish and throwing themselves ashore in their fright, where they are dispatched and used as an article of food by the Indians. The oil tried out, has certain nourishing and stimulating properties that fit it for a certain class of consumptives, being more easy of digestion than cod-liver oil. It sells in the San Francisco market at \$2.00 per gallon.

Olive Oil.—During the year ending June 30th, 1877, there were imported

into the United States nearly 400,000 gallons of olive oil valued at a little under \$500,000. In that time San Francisco imported 47,192 gallons, valued at \$97,118, on which a duty was paid of \$97,192. The value of pickled olives imported into San Francisco for that year amounted to \$13,892. Nearly all this came from ports on the Mediterranean, being produced on lands bordering on that sea.

The olive accommodates itself to almost any variety of soil, but shuns a redundancy of moisture, and prefers loose, calcareous, fertile lands, with more or less stones, as we see in the territories of Attica and the South of France. It also requires a mean temperature of 58° F., the mercury in the coldest month not to be below 41° F.

From experience in this and other countries, it seems in the olive we have a tree that can be grown on our California dry plains and naked hillsides. Give the requisite conditions of soil and climate, and it is surprising how many places in this State can be found eminently suited to the growth of the olive. This tree, as is well known, when once planted, is planted forever. It stands neglect and abuse, but should have some attention. It needs pruning and cultivation, thereby increasing the product. It is considered beyond doubt that the olive was introduced into California and planted by the Spanish missionaries in Southern California as far back as 1769. From San Diego the tree was transplanted to the other missions, and from thence to various places throughout the State. The San Diego, Santa Barbara, and San Luis Obispo districts are mostly devoted to the cultivation of the olive.

The olive introduced into California, now called the "mission olive," is of the original stock of the wild olive of Europe and Africa. It is very valuable as a stock on which to graft a bud of a more prolific kind. It has been demonstrated that the best varieties can be successfully grown over a wide range in California.

The olive commences bearing in six years from the time of planting (from the seed), but does not come to the limit of full fruitage for twenty-five or thirty years. The average product from each tree is stated at from ten to fifteen pounds of oil.

To obtain the oil, the olives are gathered from the tree before being fully ripe, but are allowed to remain a few days for the evaporation of any moisture. They are then crushed in an edge-wheel mill of stone, usually drawn by horse-power. The virgin oil is dipped from the mill and is almost invariably kept to enrich poorer qualities of oil. The crushed olives (or pomace) are placed in coarse linen bags about eighteen inches in diameter. Several of these are put into a screw-press and the power applied. The oil expressed runs into a tank. This gives the first quality of oil. The pomace is now taken from the bags, broken up finely, and again put under the screw-press for a second and third time, on each occasion yielding less oil, and of an inferior quality. After the third pressing the pomace is again broken, and a half gallon of boiling water poured into each bag. It is again pressed, yielding an inferior oil used for burning, lubricating, and in the manufacture of castile soap. Even the virgin oil when first pressed is turbid, but clears itself by standing in vessels not open to the air. It should be kept in places having an

even temperature. The product of all the pressings is about three gallons of oil to a bushel of olives.

For pickling, the fruit is gathered late in the season, just before it has commenced to turn brown; the finest fruits are selected and placed in a weak solution of soda to which lime has been added. After remaining in this solution for about ten hours, or until the pulp can be readily detached from the kernel, they are removed and placed in cold water, which is daily changed for a week. This process removes the tannin from the unripe fruit. When they cease to be bitter they are bottled in brine, which is usually made aromatic with coriander or fennel.

Whale Oil.—The whales, and their smaller relatives, the porpoises, abound along our coast, and the business of killing them for oil is carried on profitably at several points, especially in the winter and spring, by companies who attack them in boats, shoot them with the harpoon-gun, and tow them ashore to try out the oil. San Francisco is also the headquarters for the vessels employed in the North Pacific and Arctic whale fisheries, being used not only as a port of supply, but as the general receiving and distributing entrepot for the products of the fisheries. The following are the receipts of oil, bone, etc., at this port for the past six years:

Year.	Vessels.	Whalebone.	Ivory.	Whale Oil.	Sperm Oil.
1878,	16	188,812 pounds.	12,142 pounds.	11,818 barrels.	
1874,	12	86,800 "	7,600 "	10,568 "	
1875,	12	157,000 "	25,400 "	17,805 "	
1876,	7	8,800 "	7,000 "	2,800 "	80 barrels.
1877,	22	189,148 "	74,752 "	12,695 "	1,184 "
1878,	20	81,400 "	27,880 "	9,808 "	

Oranges and Lemons.—These varieties of the citrus family flourish to a great extent in the congenial climate and soil of Southern California. They prove a very profitable crop in Los Angeles County and further south, and their culture is being greatly extended. The trees require age to become profitable bearers, and in seven years attain only ten feet in height and five inches in thickness. They then only begin to bear, and not before the ninth year are they a source of profit. When in full bearing one tree produces from one thousand to two thousand oranges yearly. The orange requires nearly ten months to ripen from the blossom, and the tree has insect parasites that are very destructive. Oranges come to us from Tabiti, Mexico, Cape St. Lucas, the Sandwich Islands, and, latterly, from China. But they are plucked green, of course, and have a poor flavor. Our own oranges, requiring but three days to be sent to market, may be plucked fully ripe, and if the quality of the fruit is good they will take preference, and prove a source of profit to the grower.

In 1876 there were in California of lemon trees, 12,460,—these all in bearing; and of orange trees there were in bearing, 55,606. No attempt has been made to manufacture citric acid from the juice of the fruit, but doubtless some future time will see the fruit utilized for this purpose.

Paints.—The manufacture and sale on this coast of paints (mixed ready for use) has increased until they form a very prominent part of the trade in paints, and add materially to the manufacturing interests of San Francisco. The California Paint Company first introduced and commenced the manufacture of the Averill mixed paint on this coast in 1869. It rapidly grew in favor and demand throughout the entire coast until, even with their increased facilities for its production, the company are now obliged to secure more room for their factory, and add more extensive machinery for its manufacture. The success of the Averill has caused the introduction of other kinds, until now there are several factories established here, and nearly every wholesale house has its own special brand of mixed paint. Their convenience of form is apparent, and makes them popular with both dealers and consumers wherever they are known.

Our local makes of paints are increasing in importance every year, and will comparatively soon entirely displace the Eastern.

Paper.—Prior to 1855 every variety of paper entering into the consumption of this coast was imported; in that year the first mill having been erected in this State, the supply began to be met, in part, by paper of home production. There are now five paper mills running in California.

California, aside from its superior climate, possesses some peculiar advantages for making paper of every description. The raw material exists here in such abundance as to render a supply almost certain at moderate cost. The waters of our mountain streams, besides being ample to serve for propulsive power, are of that soft and limpid character so essential to the production of first-class paper. Very rarely in other countries do streams possess that degree of purity so necessary for cleaning purposes.

In 1876 there were received of California make 42,115 reams. In that year three of the mills confined their attention to straw paper, while the oldest-established, the Pioneer Mills, by the addition of bleaching facilities, is now making a superior cream-color manilla, comparing favorably with the best Eastern, and superior in strength.

In Los Angeles County a public-spirited citizen, Judge Walker, spent several years in introducing a new fibre from the plant "*Yucca Draconis*." This plant grows in great abundance on the Mojave desert, resembling a forest of trees, single plants making a cord of material. In 1876 a mill, called the Lick Mill, was established, and has been run with complete and increasing success. Samples of the pulp, resembling cotton as to color and texture, have been exhibited here, and the paper, made entirely from the fibre unmixed, has taken a high standard in the trade. It is claimed that a yield of actual pulp from the plant gives a much greater percentage than any other known substance, and the cost of production under Mr. Walker's process is much less. Sample bales sent East have met with great favor, and it is confidently expected that this industry will grow into immense proportions, both in supplying this coast with paper and also in shipping the material in pulp form to the East.

In 1878 imports of Eastern-made paper were smaller than those of 1877 by 2754 reams, while the receipts from the California mills were 50 per cent.

greater than the preceding year. In 1878 imports of Eastern paper fell off full 25 per cent. as compared with those of 1877. The Stockton Mill commenced supplying the trade with news paper, which has been pronounced a success, most of the papers in San Francisco using it. The manufacture of California straw paper was pushed with much vigor, and receipts were nearly equal to those of 1877. There was a reduction in prices of 1 and 2 cents since the beginning of the year. The value of the paper manufactured in California in 1878 was \$300,000.

Local mills were all kept busy, but prices ran low from the competition of Eastern mills, which at last woke up to the idea that California and the Pacific Coast might be lost to them. It seems the old story of the "English Chemical Trade" over again. But this State can more than hold its own in manufactures with the ordinary patience required in any enterprise.

Potteries.—There are a number of potteries in and around San Francisco, and two or three in other parts of the State. The works at the Mission Dolores manufacture from a clay obtained in Sacramento County every description of stoneware, and also wares for acid factories, chemical works, etc. The establishment at North Beach (San Francisco) is engaged chiefly in making sewer pipes. At San Antonio, Contra Costa County, there is quite an extensive pottery, whereat nearly every kind of stone and earthenware is made, the clay being obtained from a bed near by. There are also similar works in Sacramento, and at Antioch, Contra Costa County, fire bricks and crucibles, besides stoneware, being made at the latter, the material therefor being obtained from a seam of clay in the Black Diamond Coal Mine.

Clays suitable for making not only stone and earthenware, but also the finer kinds of crockery, etc., are found in many parts of the State, and it is probable that nearly everything required in this line will, in the course of a few years, be supplied by our local potteries.

Powder.—There are various manufactories established in California for the making and putting up of gun and blasting powder of all grades, besides the later invented "high explosives" so much used.

The willow and the alder for making charcoal are found growing plentifully throughout the State, and in fortunately close proximity to the two principal black powder works. Sulphur being plentiful throughout the State can be obtained at low prices; and although no saltpetre has been found in California, nitrate of soda is procurable, and has been imported from Peru in enormous quantities.

The California Powder Works was incorporated in 1861, and commenced the manufacture of powder in 1864, with a capacity of 250 kegs per day. In May, 1867, its capacity was increased to over 640 kegs per day, chiefly blasting-powder, and to the end of that year, 158,500 kegs, containing 25 pounds each, were turned out.

After a long struggle with the Eastern agencies here established, it prevailed, and reduced the importation of powder to a minimum. There are 15 different buildings in these works, where the various processes of manufacture are carried on. They make their own kegs in an extensive cooper shop attached to the works. The cottages occupied by the employes and their

families number 100, forming a good-sized village. The capital of the company is \$1,000,000. Besides the black powder, which, as well as being extensively used on this coast, is largely exported, they manufacture one of the new varieties of "dynamite," called the "Hercules Powder," one of the most powerful explosives known. In 1876 over 800,000 pounds of it were sold on this coast, this being a sufficient proof of its value and popularity. It was patented in 1874 by J. W. Willard. The demand for it in the mines east of the Rocky Mountains caused the establishment of a branch factory at Cleveland, Ohio. It is in especial favor for tunnel enterprises and hard-rock blasting in California, Oregon, Nevada, Utah, Arizona, Wyoming, Colorado, and the Black Hills. Its principal features are safety, strength, economy, and freedom from noxious fumes. It is put up in a plastic paste, not granulated. Should it catch fire it will burn *gradually* away. It may be hammered between wood, iron, or rock, or may be thrown from a height without exploding. A quarter of an ounce will throw a 30-pound ball over 700 feet, ten times the distance the best blasting-powder will. It freezes at 42 degrees, and explodes at 880 degrees. It should be thawed out before using, and should not be heated to over 110° F.

The Pacific Powder Mills, located near Oloma, in Marin County, were completed in 1866, at a cost of \$68,000. In the year 1867 there were manufactured here 30,000 kegs of blasting-powder and 2000 packages of sporting-powder. The buildings are distributed over an area of several hundred acres for greater security against explosions. Both steam and water power are used in preparing the material and running the machinery.

The following tables will show the receipts of California-made powder, and the imports of the Eastern for the last three years:

California.	1876.	1877.	1878.
Kegs,	148,766	96,211	72,712
Half-kegs,	459	1,298	59
Quarter-kegs,	209	3,805	1,197
Cases,	1,861	2,198	1,698
Half-cases,	273	777	32
Quarter-cases,	1,411		
Barrels,	669		
Packages,	3,772		

Eastern.	1876.	1877.	1878.
Packages,	25,614	25,178	49,590
Cases,	1,757	232	439
Half-cases,	150		12
Kegs,	25,260	670	
Half-kegs,	170		
Boxes,	211		
Half-boxes,		84	

It will be noted that the imports of Eastern powder increased largely in 1878 over those of 1876 and 1877. There was no need of such heavy impor-

tations, however, and there is an overstock in the market. The prices of California powder have not varied during the year. Blasting was quoted at \$3.25 and \$3.50.

Giant Powder.—This well-known explosive, composed of infusorial earth saturated with nitroglycerin, is manufactured at the works, six miles from San Francisco. During 1877 over a million of pounds were made and sold on this coast, and nearly as much the preceding year. As compared to black powder it is claimed to save 58 per cent. in use, or \$5.74 per foot. It is put up in cartridges, in boxes containing twenty-five and fifty pounds each. It has been in use as a blasting agent in Europe for about ten years, and in this State about nine.

Vulcan Powder.—Owing to the refusal of the railroads to transport explosives across the continent, all the companies that do business in these compounds are compelled to manufacture here. The Vulcan Company's works are located on the Truckee River, in the State of Nevada, water-power being used. The works are located two miles from Reno. Large quantities of it are sold on the Pacific Coast. It is made from chemically pure nitroglycerin. It is claimed that its use saves time, no tamping of holes being required, and the fumes passing off quickly, allowing the resumption of work in a few minutes,—a great desideratum in underground mining. It is claimed to be the strongest in effect of any blasting-powder in use. It is sold at 75 cents per pound for No. 1, 50 cents for No. 2, and 35 cents per pound for No. 3, with liberal discounts to the trade.

Salt.—Between the requirements grown out of the demand for this article for culinary uses, for meat packing, the treatment of ores, and the northern fisheries, the consumption is large in California. The principal local sources of supply are from the Alameda and Los Angeles salt works, and Carmen Island, on the coast of Lower California.

On the Alameda side of San Francisco Bay there are several companies located, whose works extend nearly twelve miles along the shore, and afford employment to some 150 men. The quantity of salt annually collected exceeds 10,000 tons, of the average value of \$8 per ton. The whole of it is collected and purified by solar evaporation. The salt water is retained in reservoirs during high tides, and evaporated in shallow ponds, ranging in size from 20 to 500 acres. Some of these salt-ponds—formed mostly of earth—are located in swamps, which, though a few years since deemed absolutely worthless, are now valued at from four to ten dollars per acre; and since the demand for salt is likely to increase, the value of these lands will doubtless appreciate.

Soaps.—There are a large number of soap factories in California, the greater number being in San Francisco, which boasts of 18 works, devoted solely to this important branch of manufacture, employing no less than 805 men, turning out, in 1877, over 17,000,000 pounds of the manufactured products, valued at over \$1,000,000.

The following table gives the importations of Eastern soaps, of all kinds, for the years 1876, '77, and '78.

Imports.	1876.	1877.	1878.
Boxes,	42,448	30,254	14,264
Half-boxes,	7,066	865	976
Quarter-boxes,		940	830
Packages,	8,660	4,871	5,650
Crates,	20	14	54
Kegs,			5
Barrels,	44		14
Half-barrels,	10		7

It will be noted that imports of Eastern soaps have materially declined, owing to the increasing skill and experience of our local manufacturers, who have learned how to cater to the public taste, and are now formidable competitors to Eastern and foreign soapmakers. The Standard Soap Company, in 1865, moved their works from this city to Berkeley, a few miles north of Oakland, and have since incorporated with a capital stock of \$500,000. They manufacture all grades, from fine toilet to the common brown soap of the laundries. This factory has a capacity for turning out 400,000 pounds of soap weekly. Considerable of the products of this company are exported to Alaska, Chili, China, Japan, Islands of the Pacific, and east to the valley of the Great Salt Lake. They make over 100 varieties of soap. The fatty acids used are made in California, and the alkali is obtained from the Pacific Soda Company. A novelty with this company is the "phosphate soap," made with phosphate of soda. They also make a popular brand of borax soap. The following are "trade notes" for the years 1877 and 1878:

1877. Very decided efforts have been made by Eastern manufacturers to gain control of this market during the year. Their soaps have been good, but we are proud to be able to maintain that many brands of California production cannot be excelled, and enjoy a reputation well deserved, and a popularity that creates a large demand. When we have some factories producing such brands as Imperial Savon, Standard Best, Thomas's Cool Water Bleaching, Roman Kitchen, etc., we feel justified in placing reliance on the factories of this coast to supply as good a quality at a cheaper price than those of Eastern or foreign make. We are pleased to notice that strictly full weight and the better quality of goods are in greater demand, and as rapidly as they are fairly tried increase in favor.

Quotations for Eastern are: Procter & Gamble's Extra Olive, 7 cents; Big Bonanza (A. E. Whyland's), 9 cents; and Troxell's Pride of the Kitchen, superior to Sapolio, \$17.50 per box of 80 cakes; California, 5 and 10 to 12 cents per pound, and 60 cents and \$1.40 per box.

1878. Imports of Eastern, though heavy for the first half of the year, as compared with the period of 1877, have fallen off nearly 20 per cent. There has been a great competition between the Eastern importers and the California manufacturers, and heavy concessions have had to be made in consequence, while tallow has been higher than in 1877. We have had a moderate export trade, and shipped considerable to Japan. Smith, Lucy & Co., manufacturers of the Peerless, Pale Family, and other well-known brands, report 7,500,000 pounds

as their product for the past year (1878), but owing to an advance in the price of the raw material there was not left as satisfactory a margin as in previous years. The demand for home-made soap is evidently on the increase, but our manufacturers will, in the end, find it for their advantage to pay more attention to the manufacture of the purer and better class of soaps, avoiding, as a rock to be shunned, the cheap trashy brands. The Alta Soap Company report the manufacture of 1,500,000 pounds, sold at 4 and 5 cents per pound. The Standard Company, whose magnificent works at Berkeley are the pride of that township, report an increased production and good prospects. Their product will be large (1879). The other principal San Francisco factories are the Bay Soap and Candle Works, the San Francisco Candle Company, and the Mission Soap and Candle Works.

Quotation of the principal goods of the Standard Company for July, 1879, are: California castile, mottled and white, 10 and 12½ cents; French mottled castile, 11 and 12½ cents; white, 17 and 20 cents; California pale and chemical olive, 4½ and 7½ cents; fancy brands, and extra quality, 6 and 8 cents; washing powders, \$8 and \$12 per gross.

Soda and Mineral Waters.—Several firms in San Francisco and other cities in California are engaged in the manufacture of carbonic acid and mineral waters. Few druggists make their own "soda water," being supplied by the manufacturers, who fill the ordinary 5 to 12 gallon fountains with plain, besides selling it upon order in bottles from 75 cents to \$1.25 per dozen; also in different style syrups. Artificial mineral waters are also made to some extent, though the average temperature in the Coast cities being comparatively low the interior makes a better showing in the trade.

Sugars, Etc.—Although both the soil and climate in many parts of California are suited to the successful culture of the sugar cane, no effort at raising it on an extended scale have yet been made, the great cost of labor forbidding large production where raw sugars can be obtained at such low rates from adjacent countries. In some parts of the State quite a quantity of syrup and molasses is annually made from the sorghum or Chinese sugar cane, but as they are of inferior quality its production is not likely to increase, except, perhaps, at a few points in the interior. The cultivation of the sugar-beet promises to be extensively introduced here, measures having been devised looking to a large planting and the erection of suitable machinery for its manufacture. The bulk of the raw sugars for the use of the three refineries of San Francisco are imported from the Hawaiian Islands, Central America, Manilla, Batavia, and Peru.

The refinery of the San Francisco and Pacific Sugar Company, the earliest founded, was incorporated in 1855 with a capital of \$800,000. The buildings are of brick, very substantial, and cover a large area. The motive power of these works consists of a 200-horse-power engine. They are capable of refining 240,000 barrels of sugar annually, and employ about 160 hands. The monthly yield averages 7000 barrels of sugar (white), 4000 barrels of crushed, and 50,000 gallons of syrup.

The product of this refinery in 1866 amounted to \$2,008,213. In 1867 16,000,000 pounds of raw sugar were worked up. The California Sugar Re-

finery, also an extensive establishment, incorporated in 1867, had a capacity for using about 100 barrels of sugar daily, or 12,000,000 pounds annually. The Bay Sugar Refinery, located in the northern part of the city, has a capacity for making about 50,000 pounds of sugar daily.

The following are the importations of sugar for the last three years :

Imports,	1876.	1877.	1878.
Manilla,	84,813,276 lbs.	17,686,781 lbs.	40,645,221 lbs.
Sandwich Islands, . .	20,141,324 "	21,197,919 "	36,919,576 "
China,	9,664,385 "	6,103,822 "	1,586,888 "
Dutch East Indies, . .	2,199,764 "	8,263,082 "	6,460,602 "
British East Indies, . .	448,800 "	3,582,720 "	835,832 "
Central America, . .	523,544 "	852,418 "	4,843,350 "
Mexico,	828,158 "	240 "	
Chili,	12,000 "		
Peru,	600 "	38,800 "	
Germany,	413 "		1,395,935 "
Eastern,	5,945,814 "	3,528,000 "	4,400,000 "
Beet,	1,000,000 "	1,500,000 "	500,000 "
Totals,	75,078,078 "	62,753,782 "	97,087,404 "

As will be seen by this table the importations of 1878 have been greater than ever before, while the consumption has been much higher. Of the beet sugar the greater part was produced in California, although included in the list.

The import and sale of Sandwich Island sugars formed an important feature in the year's importation transactions. The importation of keg sugars amounted to 94,962 kegs, or over 14,000,000 pounds. The market price for raw averaged 8 cents.

The consumption of manufactured sugars for the past four years has been as follows :

1875,	62,255,016 pounds	1877,	65,247,823 pounds
1876,	69,882,869 "	1878,	78,574,817 "

Of molasses and syrups the following quantities were placed on the San Francisco market in 1868 :

California golden,	790,421 gallons
Eastern syrup,	598,480 "
Hawaiian molasses,	60,690 "

Sulphur.—This useful mineral is found in great quantities both in California and Nevada, and is largely mined and sent to San Francisco. As much as 40,000 tons of crude and refined sulphur are annually imported into the United States from foreign countries, and previous to the year 1876 we had no home production. Heretofore the Pacific Coast has been supplied by foreign im-

portations, but such are no longer necessary, for deposits of native sulphur have been recently found in Nevada sufficient to supply not only the San Francisco market (which requires about ten tons per day), but that of the entire United States!

There are now three companies which are producing refined sulphur: the Pacific Sulphur Company, the San Francisco Sulphur Company, and the Sulphur Bank Quicksilver Company.

The first two companies have mines and refineries in Humboldt County, Nevada, while the latter, whose works are at Clear Lake, Lake County, California, obtain from one to two tons per day as a by-product from cinnabar previous to smelting it for quicksilver. The mines in Humboldt County, Nevada, consist of immense deposits of native sulphur, varying in richness from 50 to 90 per cent., and is found in ledges from 10 to 25 feet in thickness.

The works of the San Francisco Company are capable of producing about three tons per day.

The receipts of sulphur in San Francisco for the past two years have been:

1877, . . .	406,800 pounds		1878, . . .	1,888,900 pounds
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The consumption of sulphur on this coast is 4000 to 5000 tons per year.

Tallow.—California is perhaps the best country in the world, excepting Australia, for the raising of sheep. Nowhere do they thrive and multiply with so little care; and no fleeces of similar breeds are so heavy. Here, in the mountain pastures, they roam and feed themselves the year round. Sheep love length of range, and they have it here. A dry soil and climate is their special preference, and in few countries is the dry season more protracted. Great pains have been taken to improve the native breeds by crossing with choice foreign selections. The cost of keeping sheep is so trifling, and the increase is so great that it is a very money-making business. Most of the diseases common elsewhere are unknown here. Two men and a boy will take care of 10,000 sheep, the chief labor being to drive them into pens at night to protect them from the coyotes and other wild animals, which, however, are not numerous.

There is no need here to mention the wool clip of California, which has become quite an important article of export, but a few words concerning tallow deserve place.

This animal fat is used largely for soaps and a variety of other purposes. In 1868 there were over 3,000,000 sheep in California, in 1876 over 6,000,000, and it is estimated that there are at present close to 8,000,000 in the State. In 1876 there was received in San Francisco, both for home use and export, 3,815,020 pounds of tallow, and in 1877 1,800,000 pounds, selling by the quantity at 5½ to 6½ cents per pound.

Tanneries.—Prior to the settlement of California by the Americans, and for several years after, the hides of the country were all shipped away, there not being a single tannery in the State. The quantities shipped hence were immense, constituting the staple export while the country was under Spanish and Mexican rule. The first efforts at tanning, made over 20 years ago,

failed of complete success, owing mainly to the inferior quality of the bark used, the properties of the different kinds not being then well understood. In a few years, however, this difficulty was obviated, our tanners having learned to select such bark as was well suited to their purposes, of which there is an abundance in the State. There are now 45 tanneries in California, employing 350 men, using 10,000 cords of bark, and turning out 6,000,000 hides annually.

The receipts for the past three years of California leather have been as follows, in pounds:

1876.	1877.	1878.
4,221,100	4,195,400	4,071,000

Vinegar.—There being such large manufactures of native wines in California it is natural to suppose that good vinegar would be abundant and cheap, and such is the case. In San Francisco there is one factory devoted to this industry, employing 94 hands, and turning out annually 1,070,000 gallons of vinegar, valued at \$247,000, besides doing all the necessary coopering in the establishment.

Wines, Brandies, Etc.—Considering its area California is pre-eminently the wine-producing country of the world; no other has such great range of climate and varieties of soil suitable for grape-growing within its borders. France, Italy, Germany, Spain, and other countries produce different varieties of grapes; the wines made from each, however excellent in quality, being marked by differences both in aroma and flavor, so as to be readily distinguishable one from the other.

The first settlement made by whites in California took place at San Diego in 1770, by a company of Spanish priests headed by "Padre Junipero Serra." Among the various seeds and plants introduced by the padres were cuttings from vines brought from Spain by way of Mexico. These vines, wherever planted, thrived and proved more fruitful than in their native land. Their cultivation was encouraged at all of the "missions" (church establishments), at some of which, under the direction of the priests, comparatively large quantities of wine were made, and some exported.

The occupancy of the country by the United States, and the immense immigration caused soon after by the discovery of gold, created a great demand for fruit, and the wine made in the southern part of the State found a ready and profitable market.

The production of wine was at first mainly confined to Los Angeles County, where the larger part of the vineyards was located, but the profitableness of grape culture soon incited the people of more northern counties to engage in the business. Sonoma, Napa, and Solano counties attracted the attention of wine-growers by their favorable qualities of congenial soil and climate, and large numbers of vines were speedily planted. The adaptability of the foothills of the Sierra Nevada, in Amador, El Dorado, Placer, and other counties to grape culture, also caused the planting of extensive vineyards, which was likewise the case in Santa Clara and other counties near to the coast, but sheltered from the heavy fogs that often prevail.

At first grape culture under the American rule was confined to propagating the varieties which had been brought from Spain; but the enterprise of a few public-spirited men, about eighteen years since, caused the introduction of almost all the varieties of grapes known in Europe. The wine made from these grapes showed a vast improvement on that made from the native or mission grapes, and has encouraged the propagation of the finer varieties of vines to such an extent that they already predominate.

The climate and soil of the different portions of California vary greatly, and properly the State should be divided into three districts for wine-making. The section lying south of Point Conception, including Santa Barbara, Los Angeles, San Diego, and San Bernardino counties, mostly produces heavy sweet wines, containing a large percentage of alcohol, with light aroma or flavor; of these port wine is generally the best, some being of most excellent quality. The others, white and red wines, are similar to many Spanish wines and those from the Islands of the Mediterranean. Probably the finer varieties of vines which have within the last few years been planted largely will give a new reputation to this section, and enable it to take first rank again. The grapes of this district are to a very large extent made into brandy, of fair average quality, which will improve as more care, skill, and better distilling apparatus are used.

From Point Conception north, including the valleys on both sides of the Coast Range of mountains, may be classed as another district, the wines produced resembling more the tart wines of France and Germany, claret, sauterne, and hock varieties predominating. These wines, as a rule, contain a large percentage of tartaric acid, combined with tannin and a less quantity of alcohol than any others in the State. The wines made from these grapes, though still young, have in many instances challenged favorable comparison with the finer varieties of wines imported. One feature in connection with them, as of all other California wines, is their general freedom from adulteration, which is so common in the wine-shipping ports of Europe. The purity of California wines is already shown by the absence of serious physical derangement of those who drink them to excess, while many foreign wines produce results similar to those from lead and other mineral poisons. The Zinfandel, Riesling, White Frontignon, and other varieties of imported vines give wines of excellent quality, resembling in perfection the best wines made from these grapes in Europe.

A third wine section in California may be comprised in the foothills of the Sierra Nevada in Middle and Northern California. The principal wine-producing counties in this district are El Dorado, Amador, and Placer, the first being the third largest wine-making county in the State. The wines in this district are noted for their great body, aroma, and flavor, in which they resemble the finer wines of Southern Europe. The principal foreign varieties of grapes grown for wine in this district are the White Pineaux, Malaga, Muscatel, Zinfandel, Chasselas, Riesling, and Fieber Zagos, all of which are prolific bearers. The steady continuous high degree of heat maintained during the season, from May to October, produces grapes of unusual excellence and flavor, there being no foggy or cold, windy nights, which in the Coast Range district often prevails even in midsummer.

Brandy.—The distillation of brandy from grapes has now attained quite large proportions in California. It is estimated that 250,000 gallons of brandy were made in 1878. A large quantity is consumed, not more than one-half being exported. The chief objections made against California brandy are absence of "bouquet," rawness or newness of taste, and in some instances a disagreeable fiery flavor. The defects are in many instances, and can always be obviated by the proper care and skill to be observed in selecting the right material and guarding the different processes, particularly that of distillation, thereby depriving the resulting spirit of rawness or acidity of taste, the brandy only requiring age to develop the requisite bouquet.

The prices of native brandies differ greatly with the quality of the article offered for sale. While some may be purchased by the cask as low as \$1.25 per gallon, the better brands of, say three years of age, range from \$2 to \$3 per gallon jobbing rates.

Too much of the article in the market at present is the ordinary quality, though the best is attainable. A reprehensible practice obtains on the part of the "mixers" (as many of the wholesale liquor trade are styled) offering as "French brandy" a common grade of native brandy, "developed" or prepared in the ways known to these *cellar-operators*.

Clarets, Champagnes, Etc.—The common or red claret is used largely as a table wine, and designated as "vin ordinaire." The counties that furnish the most of this red claret are Solano, Sonoma, and Los Angeles. It is a cheap wine, being quite abundant; the stems are pressed with the grapes; the price ranges from 25 to 75 cents per gallon. Bottled clarets abound, being the easiest wine to make, and soonest prepared for market. Much difference, however, in quality is produced by attention to its manufacture. It is sometimes prescribed as a table stimulant and tonic.

Champagnes and sparkling wines are successfully made to considerable extent, the chief makers offering their goods in the Eastern market, where they meet with good success, comparing favorably with the most popular imported brands. Under the head of *Exports* more interesting facts will be noted concerning our native wines and brandies.

Port Wine.—This wine has always the greatest demand, and is kept in the largest quantities in our drug-stores. The majority of our California pharmacists have for years made use of a very superior article of native port unless otherwise ordered. This wine, above all others, *as imported*, is mixed with and vitiated by foreign substances added in order to increase the bulk of the original. Totally factitious port, however, which is much sold in other countries, seldom or never comes to California, showing the appreciation of the native article. The general supply of this variety is also greater and more to be depended upon than either of the other kinds used for medicine. To make good port, the grapes should be allowed to remain as long as possible on the vines without being nipped by the frost; the grapes pressed with the stems and skins. When the must is about half fermented it is suddenly checked by the addition of from five to ten gallons of brandy to the pipe of must, after previously drawing off the must into casks. In Europe twenty or twenty-five gallons are added, but California wines being much richer in

alcohol, this amount is not needed. After racking two or three times it is sweetened to the standard, if not already sweet enough, and then allowed to stand still until racked off at a proper age for sale or shipment. An examination into several samples developed a mean as follows:

Specific gravity at 62° F.,	1.0084
Volumes per cent. of alcohol,	19.0000
Percentage of dry acids,	.8200
Specific gravity of wine free from alcohol,	1.0305
Percentage of sugar,	.7000

Our native port wines would be much richer and smoother were they allowed to acquire age, but there has been so great a demand for them for medicinal purposes that they are frequently sent one year old in market. Their price varies from \$1.50 to \$3.00 per gallon, and it is estimated that about one hundred thousand gallons are annually used by the druggists of California.

Sherry.—Many varieties and grades of this wine are always on the market, and an examination reveals the fact that an average sample of a good California sherry contains 19 or 20 per cent. alcohol and 15 per cent. sugar. Some very nice qualities are procurable. The peculiar points in the process of making good sherry are: 1. To select only the best grapes, fully ripe, and free from any spot or softening; 2. To press out only one-half the juice, leaving the remainder to form the ordinary white wine; 3. Allowing the must or juice the shortest possible time to ferment, and bottling as soon as possible thereafter, first, however, adding one gallon of three year-old brandy to each ten gallons of the wine; the ordinary mode, however, I learn is much different: neglecting care in gathering, pressing all the juice out, letting it stand an unnecessary time to ferment, and then adding poorly-made new brandy.

The prices of California sherry vary. The best brings from \$9.00 to \$12.00 the case (of one dozen bottles) at wholesale, while the more common sells for from \$5.00 to \$8.00 per dozen.

White Wine—Some of our druggists use the ordinary California white wine as a substitute for sherry in many of their preparations. It is sometimes of low proof, and always of an acid taste, and much more likely to produce the officinal vinegars than the wines of the pharmacopœia. The best Sonoma white wine has:

Specific gravity at 62° F.,	.9980
“ “ free from alcohol,	1.0047
Volumes per cent. of alcohol,	8.5000
Percentage of sugar,	1.0000
“ dry acids,	.5000

In price it varies from 75 cents to \$1.25 per gallon.

Madeira, the strongest of the white wines in medical use, can be more easily substituted than sherry on account of its greater acidity, but the rich nutty flavor of the foreign madeira can be imparted to the California article by keeping, together with the exercise of skill and care in making. It should be made from the best white and black grapes, mixed and pressed together, two rackings being enough to remove any dark color remaining from the skin of the black grape.

The entire yield of California wines for the year 1878 was a little over 6,000,000 gallons. The exports of wines, brandies, etc., will be noted under the proper head.

Yeast powders form quite an important industry among us and employ the energies of four or five firms. It has been carried on for many years, and has, during the past two years, been largely centralized. The firms that manufacture yeast powder also sell in large quantity soda bicarb. and cream of tartar.

PART IV.—EXPORTS.

Long before the first settlements were made by the Pilgrim Fathers in the then sterile land of New England, soon, indeed, after the discovery of America, Hernando Cortez sent a small expedition to explore the Coasts of the Pacific, and from the leader of that expedition California derived its name. Nearly three hundred years ago, long before the first settlement in the Atlantic States, the Bay of San Francisco was discovered by Sir Francis Drake. The country was subsequently visited by Spanish navigators, but its settlement was not attempted until nearly two centuries had elapsed.

Yet San Francisco can boast of a very respectable antiquity. Its centennial is that of the nation, as on the 9th of October, 1776, the "Mission de Los Dolores de Nuestro Padre San Francisco Assis" was founded by the Franciscan Fathers. The first part of the title is still preserved in the name of the Mission Dolores Church (in the southern part of the city), whose adobe walls were raised a century ago, and the latter in that of the city itself, having supplanted the title of "Yerba Buena," its name of half a century ago. In 1819 San Rafael was founded, and gradually small communities grew up around the shores of the bay. Yerba Buena, as it was called, speedily became a place of resort for whalers, and a small village, the nucleus of the present city, was formed. The name, as may be readily imagined, was not bestowed upon the barren sand-hills that then occupied its site, but by way of contrast on the herb-covered island in the harbor (now called, however, Goat Island), around which much interest has recently centred in connection with railroad matters, then on the bay, and finally on the village that grew up by its margin.

Being a whaling emporium, its population was mainly Americans even before the discovery of gold; but its real history began in 1848, the year of political and financial revolution. Then it was confined to a few scattered houses on "Rincen" and "Telegraph" hills, connected by a thin line skirting the sandy shores of the bay.

All the present business portion of San Francisco was then covered by twenty fathoms of water, from the shores of which rose the steep hills that now rise from Montgomery Street. It was impossible to carry on business in streets climbing steep hills, and the sand beyond was not inviting; so our commercial princes set to work filling in the harbor, and as fast as its waters receded, sprang up as from their bosom the rapidly increasing city.

For a long time it nestled around the constantly changing water-front, and hugged the water-line, so long indeed, that though one of the greatest commercial emporiums of the United States for a quarter of a century, it is only within the last ten years that it has spread out beyond the immediate neigh-

borhood of the water land. About ten years ago the city began to spread to the west and south. Since then, in the older portion of the city, all the fine business blocks, hotels, public buildings, etc., have arisen. Since 1869 the population of the city has trebled, being then about 120,000. At the present time the city is hemmed in by the Mission Hills and the bay, and is spreading itself gradually southward; but the county, which is practically the city, contains as great an extent of territory as was covered by London twenty years since. All of this immense area is already mapped out with streets, etc., and before a score of years have passed the anticipations of its citizens will cause the owners of property to make surveys, and lay our streets (*in futuro*) even into the adjacent county of San Mateo.

It covers now, in a straggling manner, about one-fourth of the vast area which it is presumed it will finally occupy, and its population is rising 850,000. But if we add its suburban cities, or which in future will be termed such,—Oakland, Vallejo, etc.,—the population of the whole will not be far from 450,000; nearly one-half the population of the State, and greater than that of any other city in the Union outside of New York, Philadelphia, Boston, Chicago, and St. Louis. In the wholesale business, the great produce mart is formed by the streets adjacent to the water-front; next comes groceries, provisions, wines and spirits, in Front Street and the adjacent cross streets, while wholesale drygoods, clothing, and drug trade are located on Market and other streets intersecting. The trade of the city, whose extent has already been stated, is carried on by a great number of steam and sailing vessels, while the trade of the bay, over which almost everything passes and repasses, carried by steamers, sailing vessels, and barges, is almost as great. The steam fleet of the city, in its beginning, dates back to 1849, and has since grown to its present mammoth proportions.

The China Line was first started in 1867; steam communication with Honolulu has been had since 1861, with Australia since 1869 (including intermission), and with Oregon since 1849. The steam fleet of the city at present is as follows:

Lines.	Vessels.	Tonnage.
Panama Line,	10	21,819
China Line (Pacific Mail),	6	25,890
China Line (O. & O.),	8	9,011
Australian Line,	8	9,500
British Columbia Line,	8	4,252
Oregon Line,	10	12,888
Coast Line,	18	10,486
Bay,	185	88,578
Total,	188	117,424

The future of steam navigation of the Pacific cannot fail to be brilliant. Not only will the number of vessels be increased, as well as the frequency of the trips, but new lines will branch out in various directions, and we will have steam connection with Chili and Peru, the Philippines, Java and other East India islands, Singapore, and Calcutta, and the Pacific will boast as many and as great lines as the Atlantic. By their aid civilization and commerce will penetrate every nook and corner of the Pacific and Indian Oceans, from

which they have hitherto been excluded; and San Francisco, the centre of the magnificent trade thus created, will not only become the leading city on the Pacific, but one of the greatest in the world.

The steam fleet began in a very humble way, but has rapidly advanced in importance. It now consists of 135 steamers and tugs, of a tonnage of 33,578 tons, which reach every nook and corner of San Francisco Bay, and all parts of the Sacramento and Joaquin rivers to the limits of navigation. They carry on a great trade with the interior of the State, carrying up supplies of all kinds, and bringing back in return cereals, fruits, etc. The sailing fleet that frequents the bay for trade is large, the great size of our wheat crop attracting a great crowd of vessels, numbering in some years over 600.

Our coasting fleet consists of 580 vessels of all sizes and all rigs, from the tiny sloop to the full-rigged 1000-ton ship, and their aggregate tonnage is 88,874 tons. The inward and outward tonnage of these vessels has varied during the past fifteen years from 2000 to 2800 tons, giving an average of five trips per vessel every year. The total tonnage moved in San Francisco (sailing vessels) is as follows:

Ships.	No.	Tons.
Ships,	15	17,868
Barks,	74	89,282
Brigs,	18	5,211
Schooners,	501	86,805
Sloops,	96	1,003
Total,	704	100,829

The products of the State of the great staples, for the last two years, are as follows:

	1877.	1878.
Wheat,	\$25,000,000	\$35,000,000
Barley,	6,000,000	10,000,000
Other cereals, etc.,	8,000,000	4,500,000
Gold and silver,	20,000,000	20,000,000
Base bullion and lead,	2,286,760	2,500,000
Other base metals,	800,000	800,000
Wine and brandy,	6,000,000	5,500,000
Wool,	9,500,000	7,000,000
Lumber,	5,000,000	5,000,000
Quicksilver,	2,400,000	2,000,000
Fruit,	2,700,000	3,500,000
Cattle, etc., slaughtered,	15,000,000	17,500,000
Dairy produce,	8,750,000	4,000,000
Coal,	1,000,000	1,100,000
Increased value given to manufactures by labor,	40,000,000	85,000,000
Total,	\$141,936,760	\$152,900,000

The exports of *treasure* for the past two years compare as follows:

Destination.	1878.	1877.
New York,	\$21,685,111 44	\$38,652,000 41
China,	11,691,415 96	16,850,820 41
Japan,	127,157 59	1,418,009 67
Central America, . .	254,370 50	505,595 15
Hamburg,	201,779 82	64,669 11
Honolulu,	184,936 82	114,030 45
Paris,		55,592 50
Panama,	10,000 00	19,065 66
Peru,		10,000 00
Mexico,	5,180 00	
British East Indies, . .	52,350 00	
Great Britain,	29,900 00	
Total,	<u>\$34,232,202 13</u>	<u>\$57,688,783 36</u>

A decline of nearly \$23,500,000 is one of the most significant features of the year, and shows most plainly the extent to which merchandise exports are replacing treasure exports. The conclusion is, if the State produced less of the precious metals than in 1877, we kept more of them at home.

Description of Treasure Exported.

	1878. .	1877.
Gold coin,	\$10,759,310 50	\$29,616,899 20
Silver bars,	9,882,472 00	9,287,571 25
Silver coin,	7,056,124 71	5,766,454 60
Trade dollars,	3,417,903 67	8,638,080 98
Mexican dollars,	2,376,317 00	2,676,996 00
Gold bars,	651,894 00	1,654,581 48
Foreign silver coin,	45,801 50	27,057 50
Gold dust,	42,488 23	26,642 50
Foreign gold coin,	890 00	

The most notable feature here is the great falling off in the gold shipments to about one-third of what they were in 1877, and that of trade dollars to less than one-half. The shipments of silver coin have increased over a million and a quarter dollars, but they included standard dollars shipped to New York during the last quarter of 1878. These shipments increased monthly till the close of the year. The falling off in exports occurred in the latter half of the year, and was wonderful when compared with the same months for the previous year. The exports of treasure from this city since 1848 stands recorded as follows:

1848-1850, . . .	\$60,900,000	Brought forward, . . .	\$785,940,584
1851, . . .	45,989,000	1865, . . .	44,426,172
1852, . . .	45,779,000	1866, . . .	44,865,668
1853, . . .	54,968,000	1867, . . .	40,671,797
1854, . . .	52,054,683	1868, . . .	86,858,096
1855, . . .	45,161,731	1869, . . .	87,287,114
1856, . . .	59,697,434	1870, . . .	82,983,189
1857, . . .	48,967,692	1871, . . .	17,258,346
1858, . . .	47,640,462	1872, . . .	29,330,486
1859, . . .	47,548,026	1873, . . .	24,716,125
1860, . . .	42,825,916	1874, . . .	80,050,632
1861, . . .	40,676,758	1875, . . .	42,353,096
1862, . . .	42,561,761	1876, . . .	49,798,900
1863, . . .	46,071,920	1877, . . .	57,688,788
1864, . . .	55,707,201	1878, . . .	84,232,202
	<hr/>		<hr/>
	\$785,940,584	Total, . . .	\$1,257,551,090

The total *exports to foreign countries* from San Francisco, for the year 1878 amounted to \$28,828,935, and exports by rail to \$21,000,000.

Exports of the more important articles connected with the drug business, to foreign countries, were as follows :

Central America :

	Quantity.	Value.
Coal oil,	19,120 gallons	\$4,610 00
Hops,	9,238 pounds	900 00
Quicksilver,	60 flasks	1,786 00
Tallow,	804,862 pounds	24,740 00

Chili :

Hops,	8,866 pounds	1,163 00
Quicksilver,	200 flasks	6,235 00

Australia :

Coal oil,	4,000 gallons	865 00
Hops,	822,934 pounds	82,452 00
Quicksilver,	596 flasks	18,451 00
Tallow,	2,100 pounds	184 00

British Columbia :

Coal oil,	75,025 gallons	26,548 00
Hops,	653 pounds	129 00
Quicksilver,	27 flasks	896 00

British East Indies:

	Quantity.	Value.
Hops,	2,247 pounds	\$829 00

China:

Ginseng,	862,715 pounds	415,485 00
Hops,	790 "	77 00
Lead,	8,233,980 "	829,103 00
Quicksilver,	20,445 flasks	685,156 00

England:

Hops,	73,630 pounds	4,469 00
Syrup,	80,870 gallons	7,409 00
Tallow,	125,087 pounds	10,403 00

French Colonies (Tahiti):

Coal oil,	82,280 gallons	7,295 00
Hops,	103 pounds	25 00
Tallow,	1,075 "	86 00

Japan:

Coal oil,	1,696 gallons	569 00
Ginseng,	1,580 pounds	1,610 00
Hops,	28,676 "	2,519 00
Quicksilver,	695 flasks	22,894 00

Mexico:

Coal oil,	56,869 gallons	14,457 00
Hops,	497 pounds	68 00
Quicksilver,	10,814 flasks	848,027 00
Tallow,	26,392 pounds	2,054 00

Peru:

Hops,	11,538 pounds	1,179 00
Quicksilver,	1,180 flasks	88,900 00
Tallow,	29,388 pounds	2,548 00

Russia (Asiatic):

Coal oil,	40,396 gallons	9,658 00
Hops,	545 pounds	111 00

Sandwich Islands:

Coal oil,	40,897 gallons	9,568 00
Hops,	9,264 pounds	956 00
Tallow,	32,478 "	2,371 00

U. S. Colombia:

	Quantity.	Value.
Coal oil,	4,700 gallons	\$620 00
Hops,	25 pounds	5 00
Quicksilver,	25 flasks	840 00
Tallow,	41,555 pounds	8,270 00

Exports of Foreign Merchandise to Foreign Countries in 1878.

	Quantity.	Value.
Chemicals,		\$65,316 00
Drugs and dyes,		59,440 00
Glass, manufactures of,		446 00
Iron, pig,	862,880 lbs.	2,274 00
Oil, salad,	525 gals.	863 00
“ nut,	7,650 “	4,362 00
Opium,	2,381 lbs.	11,860 00
Soda, caustic,	47,421 “	1,427 00
Spices,	8,678 “	1,159 00
Spirits (casks),	23,587 gals.	14,273 00
“ (bottles),	1,311 doz.	5,173 00
Tin, plate,	8,934 cwt.	19,686 00
“ bars,	444 “	10,635 00
Wine (casks),	84,100 gals.	13,502 00
“ (bottles),	2,364 doz.	10,035 00

Exports of Leading Articles by Rail in 1878.

Bluestone,	41,090 pounds	Ores,	261,874 pounds
Borax,	206,961 “	Plants and trees,	24,757 “
Brandy,	427,629 “	Powder,	314,829 “
Chrome iron,	21,200 “	Quicksilver,	663,745 “
Coal,	427,659 “	Raisins,	152,026 “
Coal oil,	20,480 “	Rock soap,	14,285 “
Copper cement,	20,350 “	Seeds,	27,830 “
Drugs,	90,380 “	Silver ore,	72,270 “
Fuse,	84,351 “	Soda,	14,962 “
Glue,	181,449 “	Sal soda,	6,555 “
Honey,	1,287,549 “	Sugar,	25,967 “
Hops,	1,397,691 “	Sulphur,	73,375 “
Pig iron,	110,600 “	Tan bark,	19,910 “
Lime,	16,700 “	Whiskey,	406,923 “
Liquors,	11,825 “	Whalebone,	151,786 “
Mustard,	343,765 “	Wine,	5,784,911 “
Oil nut,	7,629 “		

Borax.—The following table shows the *exports of borax* for 1878, according to destination :

	Pounds.	Value.
New York,	1,723,081	\$98,486 24
Great Britain,	951,382	74,091 59
Japan,	4,724	403 82
Mexico,	8,872	407 49
China,	2,000	170 00
British Columbia,	950½	96 80
Sandwich Islands,	415	38 32
Total, 1878,	2,686,424½	\$173,698 76
" 1877,	5,120,289	287,677 10
" 1876,	8,449,647	236,639 22

Candles.—Exports of candles during the past year more than doubled those of 1877, the figures being for

1877, 7,927 boxes | 1878, 19,338 boxes

This shows the outside trade in this article is increasing heavily. To Mexico in one month during the year several thousand boxes were exported. The quantity manufactured during the year was 200,000 boxes, of which 190,000 were consumed.

Hides.—The following are the exports for the last three years :

	Pounds.	Value.
1878,	4,230,992	\$666,751 55
1877,	5,836,541	1,019,890 00
1876,	5,853,594	1,022,220 50

Lead.—Exports of lead for the year 1878 were :

Destination.	Pounds.	Value.
New York,	28,303,034	\$1,883,465 26
China,	8,233,980	329,103 54
British Columbia,	105,100	5,261 17
Germany,	434,800	49,500 00
Japan,	531,503	22,029 03
Australia,	138,004	6,872 75
Sandwich Islands,	175,900	5,274 74
Great Britain,	140,280	2,613 00
Mexico,	13,105	1,096 00
Peru,	20,100	1,053 00
Siberia,	4,000	250 00
Gambier's Island,	1,319	99 00
Central America,	501	88 00
Bonham's Island,	637	31 00
Total, 1878,	38,107,823	\$2,307,685 96
" 1877,	24,948,722	2,286,760 18

The above constitutes *base bullion exports*, of which one-seventh only is pure lead.

Leather.—Exports for the year, according to destination, have been as follows :

Destination.	Pounds.	Value.
Japan,	280,212	\$65,183 52
Sandwich Islands,	59,964	16,710 81
British Columbia,	25,721	7,005 61
China,	29,201	6,963 91
Mexico,	4,944	2,836 94
Germany,	9,036	1,585 07
Siberia,	2,791	706 00
Great Britain,	8,150	647 00
Tahiti,	1,743	455 00
Central America,	1,238	387 06
New Zealand,	639	164 67
Total, 1878,	418,639	\$101,146 19
“ 1877,	590,296	154,685 71
“ 1876,	415,251	97,869 62
“ 1875,	598,085	152,679 00

Exports by sea and rail for the last two years thus compare :

	1877.	1878.
By sea,	590,296 lbs.	418,639 lbs.
By rail,	768,097 “	451,833 “
Total,	1,858,393 “	870,472 “

Quicksilver.—Exports according to destination for 1878 have been as follows :

Destination.	Value.	Flasks.
China,	\$685,156 10	20,445
Mexico,	348,027 87	10,814
New York,	296,792 80	8,876
Peru,	38,900 32	1,180
Japan,	22,894 67	695
Australia,	15,450 17	472
Chili,	6,234 75	200
New Zealand,	3,000 96	124
Central America,	1,986 37	60
British Columbia,	896 82	27
U. S. Colombia,	840 00	25
Total,	\$1,420,129 33	41,918

Exports by sea since 1859 have been as follows:

Year.	Flasks.	Value.
1859,	8,867	\$126,262
1860,	8,962	818,820
1861,	85,218	1,112,654
1862,	85,707	1,169,197
1863,	26,060	966,748
1864,	87,252	1,527,963
1865,	41,256	1,738,288
1866,	30,789	1,082,940
1867,	28,824	929,726
1868,	43,507	1,380,054
1869,	23,365	747,671
1870,	12,959	402,051
1871,	11,244	852,125
1872,	14,721	875,414
1873,	6,169	462,495
1874,	6,080	642,788
1875,	28,783	1,769,463
1876,	41,099	1,639,575
1877,	46,395	1,639,646
1878,	41,918	1,420,129
Total,	523,575	\$20,748,504

California Wines and Brandies.—The export of California wines, etc., for 1878 showed a large increase over that of the preceding year, the whole amount approximating 2,000,000 gallons. This is a certain indication of the favor with which our wines are received abroad, and may be accepted as a presage of the future. The vintage of 1878, of good average quality, though slightly less in quantity than that of 1877, readily commanded 20 per cent. more in price. Our vintners are no longer incumbered with old or worthless stocks; the good wines having found a ready market abroad and for home consumption, and distillers, encouraged for the first time in many years by a remunerative price for brandy, purchased and distilled all the pricked and otherwise unmerchantable wines. In place of discouragement and gloom which for several years past have rested over our vine-growers, inducing many to dig up their vines, hope has revived, large areas are being prepared for planting with the grape, and the vintner looks forward to an ample return for his long toil.

The improvement noted is due to several causes, first of which is the substitution in 1875 of a specific tax of 40 cents per gallon in lieu of the old *ad valorem* tax on all imported wine. The result of this tax, the benefit of which we are beginning to realize, is the supplying of our people with pure and wholesome wine of native growth in place of foreign mixtures at high prices, cultivating a more refined taste, and promoting temperance thereby.

A growing demand for and appreciation of California wines at the East and in foreign countries is made evident by the increase of 25 per cent. in the export trade of 1878 over the preceding year. Anomalous as it may appear, there is every reason to believe that a large volume of wine would have been

exported, and the status of our wines abroad been better had our exporters worked together with more harmony and demanded better prices for their goods. In 1876, when stocks were far in excess of demand, many vine-growers, anxious to realize on their cellars, went East themselves or sent agents, and offered their wines at rates which were ruinous to themselves and the San Francisco trade. A tariff of prices was thus established in the Eastern market which cannot be met by dealers who pay the present prices to vintners, and have a reputation to maintain for the purity and excellence of their wines. Consequently, some of our best houses have withdrawn their travellers, contenting themselves with such orders as came unsought from first-class Eastern houses at rates which pay a small profit on their investment.

That a large portion of the wine exported has paid little or no profit to the exporter, is plainly shown by the value of the exports for 1878, which show no gain over the previous year's exports comparable to the increased amount of wine exported; this fact must be considered in connection with the fact that dealers have been compelled to pay to their growers from 20 to 25 per cent. more for their stocks this year than last. This state of affairs could easily be remedied by more harmony and concert of action among our wine merchants. There is no competition from abroad which compels the sale of good California wines at 80 cents per gallon on board ships, which cost in the new and crude condition 25 cents without cooperage at the vineyard. Yet many such sales have been made to the detriment of the State, merely in wanton competition of dealers with each other.

A much larger proportion of dry red wines has been made this year than formerly. The home consumption, fostered mainly by our French, German, and Italian population, has chiefly demanded this class of wines, and it is to be hoped that our American people will, in the course of time, be sufficiently educated in matters of taste to appreciate the superiority of this wholesome nourishing beverage over the whiskey, bitters, tea, coffee, and slops that demoralize our men and women.

Comparatively little sweet wines, such as port, angelica, etc., were made in 1878. This is in part owing to the increased demand for the dry wines, and in part to the increased cost of brandy necessary for their fortification. Sherry received more attention than formerly, the export amounting to about 75,000 gallons against less than 10,000 gallons in any former year.

Of wine suitable for champagne manufacture the last vintage yielded a larger quantity and better quality than ever before produced in California. The increasing excellence of our native champagne is obtaining recognition at home and abroad, and in this is the germ of an immense industry. The dry white wines of last season were of excellent quality, the weather having favored the thorough fermentation of the must; the greater part of the vintage being derived from Riesling, Zinfandel, Chasselar, Malvoisie and other choice varieties of foreign grapes, which are fast supplanting the "Mission grape." For port, sherry, angelica, and all sweet wines, the Mission grape is undoubtedly the best yet planted in our soil, but for the better qualities of dry wines its day has passed.

The yield of brandy from the past season's vintage was small compared to that of preceding years, notwithstanding the increased demand and better

prices obtained. The privilege of bonding brandy for three years has been of great benefit to California vintners, although the system is very incomplete. We cannot send the brandy East in bond, cannot use it in the manufacture of sweet wines without payment of a tax that prohibits competition with countries which impose no tax on brandy for that purpose, can get no rebate for brandy lost in bond by leakage, and "have generally to follow a line of silly red tape that confuses the revenue officials and sends the unhappy distiller to the penitentiary or the insane asylum."

The *exports of wine* for 1878, according to destination, were as follows :

Destination.	Gallons.	Cs.	Value.
New York (by rail and sea), .	1,738,023½	743	\$739,694 94
Central America,	5,967	1,971	18,394 22
Mexico,	9,955	284	5,548 67
Germany,	2,017	60	2,170 25
Great Britain,	2,253	23	1,613 00
U. S. of Colombia, . . .	1,005	214	1,481 00
Siberia,	1,121½	14	1,225 65
British Columbia, . . .	1,408½	65	1,185 60
Japan,	202½	184	1,075 32
Philadelphia,	1,147	1	722 30
Sandwich Islands, . . .	114	86	619 48
Asia,	428	20	388 00
China,	80	39	296 50
New Zealand,		21	256 32
Tahiti,	225	20	207 87
Australia,	25	18	80 50
Baltimore,	172		68 80
Peru,		12	48 00
Pacific Islands,		10	40 20
Bonham "		5	19 00
Gambier's "		4	15 00
Total (1878),	1,764,144	3,794	\$770,150 62
" 1877,	1,461,294	2,358	769,198 72
" 1876,	962,689½	1,828	547,872 21

Exports of brandy for the year 1878, according to destination, were :

Destination.	Gallons.	Cs.	Value.
New York (rail and sea), . .	125,064	3	\$242,655 28
Mexico,	40	96	608 57
Philadelphia,	170		310 00
Siberia,	291		218 25
Japan,	96		108 00
Pacific Islands,		10	41 00
Central America,	2	5	88 00
Panama,	10		15 00
Total,	125,678	114	\$244,019 10

Of the above nearly all the rail shipments, amounting to over 400,000 gallons, were sent by rail to Western trade centres of the Mississippi Valley.

The following were the rates for California :

Wines, etc., in quantity at the close of 1878. Native brandy, in bond, low proof, in bbls., .75 and \$1.10; half bbls., .80 and \$1.10; pipes, .65 and .75; free, tax paid stamps, low proof, in bbls., \$1.75 and \$2.25; do. half bbls., \$1.80 and \$2.25; do. in pipes, \$1.70 and \$1.80.

Dry red or white wine (from Mission grapes),	.40 and .50	per gallon.
" " " foreign "	.50 and .65	"
Port, . . . . .	.75 and \$1.25	"
Angelica, . . . . .	.75 and .90	"
Searle's sherry, 5000 gallons, . . . . .	.65 and .70	"
" 1000 " . . . . .	.70 and .75	"
" 500 " . . . . .	.75 and .80	"
" single casks, . . . . .	.90 and \$1.25	"

PART V.

Price List of California Medicinal Plants.

Alder bark,	\$0 45	Manzanita leaves,	\$0 50
Berberis aquifolium,	50	Maple bark,	50
Buckeye bark,	45	Mistletoe,	60
Buckthorn "	60	Oak bark, Q. lobata,	35
Butterfly plant,	1 00	" Q. aquifolia,	35
Cascara sagrada,	50	Quinine bush,	75
Damiana leaves,	75	Sage, wild,	35
" tops of plant,	35	Spikenard root,	40
" " cracked,	38	Tarweed, blue,	45
El Gobernador,	85	" green,	60
Eucalyptus leaves,	25	" white,	40
Fleabane,	35	" yellow,	50
Ginger leaf,	60	Tyone bark,	60
Grindelia robusta,	25	" leaves,	75
" squarrosa,	40	Willow bark,	40
Kidney root,	60	Wild sunflower root,	60
Laurel leaves,	45	Yerba buena,	75
Life everlasting,	50	" marra,	45
Lilac bark,	75	" reuma,	30
Madrona bark,	40	" santa,	25
" leaves,	45		

REPORT OF THE COMMITTEE ON LEGISLATION.

THE Committee is pleased to report that during the past year two pharmacy acts have been passed, one amending the law passed for the State of New Jersey in 1877, the other regulating the practice of pharmacy in the county of Kings, New York, which embraces the city of Brooklyn.

The amended New Jersey Pharmacy Act is a copy of the one previously passed, except that in

Section 4, it is made the duty of the Board of Pharmacy to embrace, in the annual report to the Governor, a detailed statement of receipts and expenditures; the quarterly meetings are to be held alternately in the cities of Paterson, Newark, Trenton, and Camden, thirty days' notice being given of such meetings. It also describes the nature of the entries to be made in the book of registration.

Section 5, permitting those actually in business to register within ninety days, has been repealed.

Section 6. The fee for examination and registration is made to accompany the application, and in case of failure is not returned, but covers also a second examination within the time of six months from the first. The registration without examination, at a charge not exceeding two dollars, is restricted to graduates of incorporated colleges or institutes of pharmacy, the clause permitting the registration of graduates of medical colleges having been very properly repealed.

Section 7. All moneys received in excess of the per diem allowance to the members, and of the necessary expenses of the board, are to be paid over to the treasurer of the New Jersey Pharmaceutical Association, instead of to the counties in which the money has been collected.

The King's County, New York, Pharmacy Act is in the main a copy of the law enacted for the city of New York in 1872; but while graduates in medicine are entitled to registration as pharmacists in New York, they must have had at least four years' experience in prescription stores before they can be registered in Brooklyn. The Board of Pharmacy consists of two pharmacists elected by the King's County Pharmaceutical Society, two physicians elected by the King's County Medical Society, and a pharmacist who is to be secretary of the board, and elected by

the joint ballot of the other four members. The law recognizes licentiates in pharmacy, who must have had four years' experience in prescription stores, and passed an examination before the King's County or *any other* recognized board of pharmacy. We doubt this last clause to be a judicious one, since the qualifications demanded from the applicants must necessarily vary considerably in different localities, and since, according to the laws of several States, two distinct examinations are required of non-graduates, one qualifying them as assistants, and another more stringent one for determining their competency as proprietors or managers of pharmaceutical establishments. It would seem that the letter, if not the spirit, of the King's County law, recognizes those assistants as licentiates, who by registration may become registered pharmacists. The examination fee is \$5, and in case of failure to pass a second examination is granted without the payment of further fee. A very important provision, which appears for the first time in a pharmacy act, is the one investing the board with the duty of examining into and adjudicating upon all cases of alleged abuse, fraud, malpractice, or incompetence; and with the power of suspending or revoking the registration of any practicing pharmacist after due notice and trial before the board. The law makes provisions for the sale of poisons and against the adulteration of drugs, and for each violation prescribes a penalty not exceeding \$500. All fees and penalties are to be paid over to the treasurer of the King's County Pharmaceutical Society, but the money received from the fees only is to be used towards paying the salary of the secretary, and the necessary expenses of the board, while the receipts from penalties are to be used for the benefit of the society.

Section 11 makes it the duty of the district attorney to prosecute any and all violations of the law.

The Pharmacy Board has been constituted as follows: G. M. Baker, M.D. (President), and G. A. Newman, from the Pharmaceutical Society; J. D. Rushmore, M.D., and A. Haslett, M.D., from the Medical Society; and L. E. Nicot (Secretary), elected on joint ballot.

It has been stated recently by several medical journals that a law had been passed in Wisconsin, prohibiting the renewal of prescriptions, in case it should be indicated in printing or writing by the physician upon the prescription that it is not to be renewed except upon his special order. On applying to our fellow-member,

John R. Drake, for a copy of the law, we have been informed "that there has been no law passed by the Wisconsin legislature restricting the duplication of physician's prescriptions; such a proposition was before the last legislature, but met with very general ridicule."

Missouri has been blessed with a druggists' liquor law, which was approved May 19th, 1879. From the information received by the committee, it appears that the occasion of such a law was the existence in the State of numerous "wildcat drug stores" established for the purpose of selling liquors. If the law should have the effect of compelling these interlopers to follow their vocation under the proper title of "liquor dealers," it would not have been enacted in vain; but it would seem that a State law regulating the practice of pharmacy would have accomplished better results.

The laws mentioned above are all of the passage of which your committee has been informed. In several other States the regulation of the practice of pharmacy and of the sale of poisons has claimed, to a certain extent, the attention of the legislature, without reaching final action. Copies of the new laws are appended to this report.

JOHN M. MAISCH,
Chairman of the Committee on Legislation.

PHARMACY LAW OF NEW JERSEY.

AN ACT to Regulate the Practice of Pharmacy. (Approved March 9th, 1877. Chapter CXXXIII.) (Amended, March 14th, 1879. Chapter CLVII.)

1. BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey*, That from and after the passage of this act, it shall not be lawful for any person other than a registered pharmacist to retail, compound, or dispense medicines or poisons, or to open or conduct any pharmacy or store for retailing, dispensing, or compounding, drugs or medicines, unless such person shall be, or shall employ and place in charge of said pharmacy or store, a registered pharmacist, within the meaning of this act.

2. *And be it enacted*, That any person not being or having in his employ a registered pharmacist, within the meaning of this act, who shall, after the first day of January, one thousand eight hundred and seventy-eight, keep a pharmacy or store for retailing or compounding medicines, or who shall take, use, or exhibit the title of registered pharmacist, shall, for every such offence, be liable to a penalty of fifty dollars; such penalty to be sued for and recovered by the Board of Pharmacy hereinafter mentioned, in the same manner provided by the statutes of this State for the recovery of penalties in other *qui tam* actions; *provided*, that nothing in this act shall apply to or in any

manner interfere with the business of any physician, nor prevent him from supplying to his patients such articles as may seem to him proper, nor with the making or vending of patent or proprietary medicines, nor with the sale of the usual domestic remedies by retail dealers in rural districts.

3. *And be it enacted*, That on or before the first day of July, one thousand eight hundred and seventy-seven, and of every third year thereafter, the New Jersey Pharmaceutical Association shall submit to the Governor the names of fifteen pharmacists doing business within the State, out of which number the Governor shall appoint five persons, who shall constitute the Board of Pharmacy of the State of New Jersey; shall hold office for the term of three years, and until their successors shall have been appointed and qualified, and within thirty days after their appointment, each person so appointed shall take and subscribe an oath before any officer authorized to administer an oath in the State, that they will faithfully and impartially discharge the duties prescribed by this act; and in case of the death, resignation, or removal from the State of any member of said board, the Governor shall appoint in his place a pharmacist from among the fifteen names last submitted to him, to serve as a member of the board for the remainder of the term.

4 *And be it enacted*, That it shall be the duty of the Board of Pharmacy to examine all applications for registration; to grant certificates of registration to such persons as may be entitled to the same under the provisions of this act, and to such others as it shall judge on examination to be properly qualified to practice pharmacy; to cause the prosecution of all persons violating the provisions of this act, and to report annually to the Governor, on the condition of pharmacy in the State, which said report shall embrace a detailed statement of receipts and expenditures; it shall meet at least once in three months, alternately in the cities of Paterson, Newark, Trenton, and Camden; shall give thirty days' notice of the time and place of such meetings; shall elect a president, secretary, and treasurer; shall have power to make by-laws for the proper fulfilment of its duties under this act, and shall keep a book of registration, in which shall be entered the names and places of business of all persons registered under this act.

Section 5 repealed.

6. *And be it enacted*, That all persons who, subsequent to the passage of this act, shall purpose to establish a pharmacy or store within this State, for the dispensing and compounding of physician's prescriptions, or for the retailing of medicines, shall, previous to the opening of the same to the public, appear before or apply to said Board of Pharmacy for registration; every person so applying for registration under this act, shall, at the time of making such application, pay to the treasurer of the Board of Pharmacy an examination fee of five dollars, and upon passing an examination satisfactory to said board, such person shall, without further fee, receive from said board a certificate of registration; *provided*, that if any person so examined shall, at the first trial, fail to pass a satisfactory examination, such person shall be entitled to a second examination without any additional fee, at any time not later than six months from his first examination; and provided further, that any person holding a diploma from any regular incorporated college or institute of pharmacy, shall be entitled to a certificate of registration without examination by

said board, the fee for which certificate shall be fixed by said board, but the same shall in no case be fixed at a sum higher than two dollars.

7. *And be it enacted*, That the members of said board shall receive the sum of five dollars for each day actually engaged in this service, to be paid from the receipts of fees and penalties collected under the provisions of this act; and that all moneys received by the said board by virtue of this act, in excess of said per diem allowance, and of the necessary expences of said board, be paid to the treasurer of the New Jersey State Pharmaceutical Association at the next annual meeting, to whom, at such meeting, said board shall render account of all moneys received by them pursuant to this act, whether there be any excess as aforesaid or not.

8. *And be it enacted*, That this act shall take effect immediately.

PHARMACY LAW OF KING'S COUNTY, NEW YORK.

AN ACT governing the sale of Drugs and Poisons in the County of Kings, State of New York.

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

SECTION 1. It shall be unlawful from and after the first day of October, one thousand eight hundred and seventy-nine, for any person, unless a registered pharmacist within the meaning of this act, to open or conduct any pharmacy or store for retailing, dispensing, or compounding medicines or poisons, or for any one not a registered pharmacist to prepare physicians' prescriptions, except under the supervision of a registered pharmacist in the county of King's.

SEC. 2. Any person in order to be registered shall be either a graduate in pharmacy, a graduate in medicine, or shall at the time of the passage of this act have had ten (10) years' practical experience in the preparation of physicians' prescriptions, and in compounding and vending medicines and poisons, or shall be a licentiate in pharmacy.

SEC. 3. Graduates of pharmacy and graduates in medicine, under the requirements of this act, must have had at least four years' experience in stores where prescriptions of medical practitioners have been compounded, and obtained a diploma from some legally constituted college of pharmacy or medicine. Pharmaceutists claiming the right of registration under this act on account of practical experience shall, within ninety days after its organization, show to the satisfaction of the Board of Pharmacy, to be created by this act, that they have had ten (10) years' practical experience in the preparation of physicians' perscriptions, and in compounding and vending medicines and poisons. Licentiates in pharmacy must have had four (4) years' experience in stores where prescriptions of medical practitioners have been prepared, and shall have passed an examination before the Board of Pharmacy of the county of King's, or before any other recognized board of pharmacy.

SEC. 4. The Board of Pharmacy of King's County shall consist of five members, two of whom shall be pharmacists qualified for registration as aforesaid, to be elected by the King's County Pharmaceutical Society, at a special meeting to be called for the purpose, within two weeks after the passage of this act; two practitioners of medicine to be elected by the Medical Society of the

county of King's, at its next stated monthly meeting after the passage of this act; and a pharmacist, who shall also be a secretary of the board, to be elected by the joint ballot of the members elected as herein provided for. The members of this board shall within thirty days after their election, as aforesaid, individually take and subscribe before the clerk of the county of King's, an oath faithfully and impartially to discharge the duties prescribed for them by this act. They shall hold office for the term of three years, and until their successors are duly elected and qualified, and in case of vacancy it shall be filled in manner herein provided. The board shall organize for business by the election of a president to serve for the full term. The board shall meet at least once every three months, and three members shall constitute a quorum. The duties of the board shall be to examine and register pharmacists in the regular order of their application, to transact all business pertaining to the legal regulation of the practice of pharmacy in said county, and to examine into and to adjudicate upon all cases of alleged abuse, fraud, malpractice or incompetence, and it shall be competent for the said board, by a vote of three-fifths of its members, to suspend or revoke the registration of any practicing pharmacist, after due notice and trial before said board. It shall be the duty of all persons, not exempt therefrom by the provisions of this act, to appear and apply for examination within ninety days after the organization of the board. And any person so applying shall furnish to the board satisfactory evidence that he has had at least four years' experience in the compounding of physicians' prescriptions and in the general duties of pharmacy, and shall pay to the secretary of the board a fee of five dollars. And should he pass such examination satisfactorily, he shall be furnished with a certificate as to his competency and qualifications, signed by the members of the Board of Pharmacy, which certificate shall be his warrant for registration. In case of failure to pass a satisfactory examination, he shall be granted a second examination without the payment of further fee.

SEC. 5. It shall be the duty of the secretary to keep a book of registration at some convenient place, of which due notice shall be given through the public press, in which shall be entered under the supervision of the board the names and the places of business of all persons coming under the provisions of this act, and a statement to be signed by the person making the application of such facts in the case as he may claim to justify his application. The fee for registration of those in business for themselves shall not exceed two dollars, and for those in the employ of others shall not exceed one dollar. The secretary shall give receipts for all moneys received by him, and pay over the same to the treasurer of the King's County Pharmaceutical Society, taking his receipt therefor, which moneys shall be used for the purposes of defraying the expenses of the Board of Pharmacy, and any surplus shall be for the benefit of said society. The salary of the secretary shall be fixed by the board, and shall be paid out of the fees for examination and registration.

SEC. 6. Every registered pharmacist from and after the first day of October, eighteen hundred and seventy-nine, shall be held responsible for the quality of all drugs, chemicals and medicines he may sell or dispense, with the exception of those sold in the original packages of the manufacturers, and also those known as "patent medicines," and should he knowingly, intentionally

and fraudulently adulterate, or cause to be adulterated, such drugs, chemicals, or medical preparations, he shall be deemed guilty of a misdemeanor, and upon conviction thereof be liable to a penalty not exceeding one hundred dollars, and in addition thereto his name shall be stricken from the register.

SEC. 7. It shall be unlawful for any person from and after the first day of October, eighteen hundred and seventy-nine, to retail any poisons enumerated in schedules A and B, as follows, to wit:

SCHEDULE A.

Arsenic and its preparations, corrosive sublimate, white precipitate, red precipitate, biniodide of mercury, cyanide of potassium, hydrocyanic acid, strychnia, and all other poisonous vegetable alkaloids and their salts, essential oil of bitter almonds, opium and its preparations, except paregoric, and other preparations of opium containing less than two grains to the ounce.

SCHEDULE B.

Aconite, belladonna, colchicum, conium, nux vomica, henbane, savin, ergot, cottonroot, cantharides, creasote, digitalis, and their pharmaceutical preparations, croton oil, chloroform, chloral hydrate, sulphate of zinc, mineral acids, carbolic acid, and oxalic acid, without distinctly labelling the bottle, box, vessel, or paper in which the poison is contained, and also the outside wrapper or cover, with the name of the article, the word "poison," and the name and place of business of the seller; nor shall it be lawful for any person to sell or deliver any poison enumerated in said schedules A and B, unless upon due inquiry it be found that the purchaser is aware of its poisonous nature, and represents that it is to be used for a legitimate purpose. Nor shall it be lawful for any registered pharmacist to sell any poisons included in schedule A, before delivering the same to the purchaser, causing an entry to be made in a book kept for that purpose, stating the date of sale, the name and address of the purchaser, the name and quantity of the poison sold, the purpose for which it is represented by the purchaser to be required, and the name of the dispenser; such book to be always open for inspection by the proper authorities, and to be preserved for reference for at least five years. The provisions of this section shall not apply to the dispensing of poisons, in not unusual quantities or doses, upon the prescriptions of practitioners of medicine.

SEC. 8. Nothing contained in the foregoing sections shall apply to or interfere with the business of any practitioner of medicine who does not keep open-shop for the retailing of medicines and poisons; nor with the business of wholesale dealers, excepting section seven and the penalties for its violation.

SEC. 9. Any person who shall attempt to procure registration for himself, or for any other person under this act, by making or causing to be made any false representation, shall be deemed guilty of a misdemeanor, and shall upon conviction thereof be liable to a penalty not exceeding five hundred dollars. Any registered pharmacist who shall permit the compounding and dispensing of prescriptions of medical practitioners in his store or place of business by any person or persons not registered, except under the supervision of a registered pharmacist, or any person not registered who shall keep open-shop for the retailing or dispensing of medicine and poisons, or who shall fraudulently

represent himself to be registered, or any registered pharmacist or dealer in medicines who shall fail to comply with the regulations and provisions of this act, in relation to retailing and dispensing of poisons, shall for every such offence be deemed guilty of a misdemeanor, and upon conviction thereof be liable to a penalty not exceeding five hundred dollars.

SEC. 10. All previous acts and parts of acts applying to the county of King's, relating to the practice of pharmacy and the sale of poisons, and conflicting with the provisions of this act, are hereby repealed.

SEC. 11. It shall be the duty of the district attorney of the county of King's, upon information of the Board of Pharmacy herein created, to prosecute any and all violations of this act.

SEC. 12. Each and every penalty recovered under this act shall be paid to the treasurer of the King's County Pharmaceutical Society for the benefit of the society.

SEC. 18. This act shall take effect immediately.

Approved June 12th, 1879.

DRUGGISTS' LIQUOR LAW OF MISSOURI.

(Session Acts, pp. 166-7.)

Be it enacted by the General Assembly of the State of Missouri, as follows:

SECTION 1. No dealer in drugs and medicines shall, directly or indirectly, sell or give away any intoxicating liquors and medicated bitters containing alcohol, in any quantity less than one gallon, and in no quantity to be drank upon the premises, without first having obtained, in the manner provided by law, a license as a dram-shop keeper, except as hereinafter specified.

SEC. 2. No person shall be deemed a dealer in drugs and medicines within the meaning of this act, and as such authorized to sell or give away intoxicating liquors as herein specified, unless he shall have or maintain a store, or known place of business, shall have complied with the provision of the law relating to "merchant[s]' license," and shall have, at all times, on hand at said store or place of business, a stock of goods such as are usually kept in drug-stores, exclusive of intoxicating liquors.

SEC. 3. Such dealer in drugs and medicines may sell or give away, in any quantity, wines for sacramental purposes; liquors of any kind when the same are prescribed by a regularly registered physician, or are used solely in the admixture of necessary remedial compounds, the preparation of tinctures, and the compounding of a written prescription, made and signed by some regular practicing physician, who shall have stated in such prescription that the liquor therein prescribed is a necessary ingredient; *provided*, that such prescription shall in no case authorize such sale or gift more than one time.

SEC. 4. Any dealer in drugs and medicines, who shall violate the provisions of this act shall be deemed guilty of a misdemeanor, and upon conviction be punished by a fine of not less than forty nor more than two hundred dollars.

SEC. 5. Any physician, or pretended physician, who shall make or issue any prescription to any person for intoxicating liquors, in any quantity, or for any compound of which such liquors shall form a part, to be used otherwise than

for medicinal purposes, or who shall make or issue any prescription contrary to the true intent and meaning of this act, shall be deemed guilty of a misdemeanor, and, upon conviction, be punished by a fine of not less than forty nor more than two hundred dollars.

SEC. 6. Any person who shall forge or counterfeit any prescription or certificate, in the name of any physician, for the purpose of procuring, or enabling any other person or persons to procure, any intoxicating liquors, or the sale thereof, shall be deemed guilty of a misdemeanor, and, upon conviction, be punished by a fine of not less than fifty nor more than three hundred dollars, or by imprisonment in the county jail for a term of not less than thirty days nor more than three months, or by both such fine and imprisonment, at the discretion of the court.

SEC. 7. Every druggist in this State shall carefully preserve the prescriptions for all intoxicating liquors sold by him under the provisions of section three of this act, and shall produce them in evidence whenever legally required so to do. Any druggist who shall fail to comply with the provisions of this section shall be fined not less than forty nor more than one hundred dollars. All courts having jurisdiction in criminal causes are required to give this act in charge to each grand jury impanelled in such courts.

SEC. 8. An act entitled "An Act to Regulate the Sale of Intoxicating Liquors by Dealers in Drugs and Medicines," approved May 2d, 1877, and all other acts or parts of acts inconsistent with the provisions of this act are hereby repealed.

Approved May 19th, 1879.

REPORT OF THE COMMITTEE ON THE REVISION OF THE U. S. PHARMACOPŒIA.

TO THE AMERICAN PHARMACEUTICAL ASSOCIATION:

In his report on the operations of the Committee on the Revision of the U. S. Pharmacopœia, presented to the Association last year, the undersigned requested to be relieved from his duties as chairman of the committee, owing to impaired health. The Association acceded to this request, and reconstructed the committee, incorporating into it some new members, and selecting as chairman Mr. Louis Dohme, of Baltimore, a selection which promised the best possible results. Unfortunately, however, Mr. Dohme subsequently found it impossible to accept the position, as the condition of his eyesight did not permit him to carry on the correspondence incidental to the office. The postponement of last year's meeting to November 26th, and various other circumstances, caused a delay of several months before the undersigned

was notified, that a new selection of chairman was necessary. After several ineffectual attempts to induce other members of the committee to accept the position, the undersigned, rather than let the whole plan fail for want of an organization, consented, much against his wish, to re-accept the office on the authority of the Executive Committee and of the President. But when he received the notification of his appointment there remained only four months of the year, so that the chances of a successful termination of the labors of the committee were greatly diminished. This much by way of preface.

Two years ago this Association undertook to try the experiment of preparing a complete pharmacopœia, which was to be laid before the Association at this present meeting. Some were sanguine enough at that time to hope that this plan could and would be carried out; others, better remembering how such promises are apt to be kept, expressed doubts as to the ultimate success. The undersigned, although he had previously had ample experience that promises and pledges are not always fulfilled, still believed to see so much enthusiasm and zeal among the members of the Association, that he had strong hopes of ultimate success. To-day he is compelled to acknowledge that his anticipations were not fulfilled in the manner expected. But he is happy to state that the prophecies of the other side, as to complete failure, are likewise unfulfilled. If the committee had accomplished nothing more than to keep alive the interest in the forthcoming revision of the U. S. Pharmacopœia, it would not have been in vain. But the results are indeed much greater, though not all in a condition to be laid before the Association at this meeting.

The revision of the *text* of the U. S. Pharmacopœia according to the plan of this committee involves:

1. A thorough revision of the list of crude drugs, their correct and concise description, and the addition of such new ones as have come into use since the last revision of the work.
2. A reconstruction of the chemical portion of the book, necessitating the more accurate description of the substances, with tests of identity and purity.
3. A reconstruction of the pharmaceutical part, not only as to the selection of better methods and processes where necessary, but also requiring all formulas to be recalculated into parts by weight in as simple proportions as possible.

These are the main features, leaving aside other details, so far as the mere *text* is concerned. The first-mentioned portion of the work, which relates to pharmacognosy, was undertaken by Professor J. M. Maisch, whose report is probably ready by this time, although it has not yet reached the undersigned. Descriptions of the indigenous articles of *Materia Medica* were furnished last year by Mr. Charles Mohr. The second portion, embracing chemistry, has made much slower progress, mainly for the reason that the task was too large to be performed by a single person, except he had at his command a large amount of free time. Dr. Fred. Hoffmann, who had charge of this department, has done all he could, and what he has furnished is very thorough and perfect. But the attention of the undersigned was not early enough drawn to the fact that this section should have been subdivided at the very beginning. Concerning the third portion of the work, the undersigned has the satisfaction to state that *almost* all data necessary for its completion are in his hands. Various contributions have only lately reached him, and as he desired to write every formula himself, in order to bring harmony into the whole he has been unable to write out more than are herewith submitted. This contribution is not yet offered in the sense of a final copy; only after the whole manuscript has been written out and carefully read over, will it be possible to eliminate discrepancies, misreferences, or other matters interfering with harmony, both in methods and in language. With this observation the accompanying manuscript is offered as a specimen of the reconstructed formulas. It may be that some of them will be found defective, or to serve as examples how a certain formula should *not* be constructed; but even this negative quality will result in a positive benefit, as it will enable the final Committee on Revision to avoid the error.

The task of the undersigned is therefore not yet completed, but he is by no means anxious to keep in the harness. There are probably but few members of the Association who will have a fair conception of the labor and time required for carrying on this work, especially under circumstances in which the undersigned is placed. But he must acknowledge that the work has been mostly a pleasure to him, both from the pleasant associations with the other members of the committee, and from the fact that he has learned many little details which hardly ever obtrude

themselves to an observer, except when engaged on a work of this kind.

The department of pharmacy has had the valuable aid of various members of the committee. Professor Joseph P. Remington, of Philadelphia, who had undertaken the subject of tinctures, has finished his task, and his report is herewith presented to the Association.

Mr. Samuel A. D. Sheppard, of Boston, accepted the section of "syrups," and furnished formulas which were made use of in the construction of the formulas submitted in the accompanying manuscript.

Mr. William H. Crawford, of St. Louis, has furnished formulas of wines.

Mr. Byron F. McIntyre, of New York, contributed formulas of elixirs.

Professor C. Lewis Diehl will submit a further report on the subject of fluid extracts.

Mr. Louis Dohme has furnished the necessary calculations to reconstruct the spirits and the iron preparations of the pharmacopœia.

Mr. J. U. Lloyd has contributed quite a number of papers on various subjects selected by him, a portion of which have already been published at his own suggestion, in order to give ample time for criticism and suggestions. Some new contributions by the same author are herewith presented.

Professor W. T. Wenzell, of San Francisco, at the request of the undersigned, undertook the subject of preparing diluted alcohol by weight. His paper is herewith presented.

The undersigned presents a manuscript containing "Selected Formulas submitted for Examination and recommended for Adoption," the formulas in which are based, first, on the contributions of gentlemen in and outside of committee, some of whom have already been mentioned in last year's Report, and second, on his own views and calculations. It would have been impossible to accompany each formula with a statement to whom such or another suggestion is due. This is done only where some important modification was suggested.

In order to give time for collecting the material still in course of preparation by various members, and so put it into as presentable condition as possible, it is recommended that this committee be continued until the convention meets in Washington, in May,

1880 ; that the Secretary of this Association at that time present the report of this committee ; and that from and after that date this committee be discharged.

Respectfully submitted,

CHARLES RICE,
Chairman.

NEW YORK, September 6th, 1879.

Portions of the different reports are here appended as specimens of the manner in which the labor has been performed :

Althæa—*Marshmallow Root*.—The root deprived of the corky layer of *Althæa officinalis*, Lin. Natural order, Malvaceæ.

Cylindrical or conical, longitudinally wrinkled pieces, from seven to fifteen centimeters (three to six inches) long, and about one centimeter (half an inch) in diameter ; externally white, mealy, somewhat hairy from detached slender bast fibres, and marked with circular scars of the rootlets ; fracture short and granular, whitish, showing a thickish bark and a fleshy or mealy centre. It has a faint peculiar odor, and a sweetish mucilaginous taste.

Ammoniacum—*Ammoniac*.—A gum-resin from *Dorema ammoniacum*, Don. Natural order, Umbelliferæ.

Globular or irregular roundish, often somewhat flattened tears, either distinct or agglutinated, pale brownish-yellow externally, and breaking with a conchoidal, waxy, milk-white fracture. It softens by the heat of the hand, yields a white emulsion when triturated with water, and has a peculiar, somewhat balsamic odor, and a bitter acrid and nauseous taste.

Cake ammoniac having the tears imbedded in a brown resinous mass should not be employed internally.

Amygdala amara—*Bitter Almond*.—The seed of *Amygdalus communis* var. *amara*, Lin. Natural order, Rosaceæ, Amygdaleæ.

About two centimeters (three-quarters inch) long, ovate-lanceolate, flattened, covered with a brown scurfy testa, having a broad mark (chalaza) at the rounded end, and about sixteen veins extending to the pointed end. On macerating the seed in warm water the skin is easily removed from the white oily embryo, which consists of two ovate-lanceolate plano-convex cotyledons and a short projecting conical radicle. When triturated with water bitter almond yields a white emulsion, having an odor resembling that of hydrocyanic acid and a bitter taste.

Amygdala dulcis—*Sweet Almond*.—The seed of *Amygdalus communis* var. *dulcis*, Lin. Natural order, Rosaceæ, Amygdaleæ.

In shape, appearance, and structure like the bitter almond, though usually, rather larger. The emulsion obtained by trituration with water is inodorous and has a bland taste.

Aurantii folia.—The leaves of the bitter orange. *Citrus vulgaris*, Risso. Natural order, Aurantiaceæ. Smooth, oblong-ovate, acuminate, entire, leaves pellucid-punctate, with a jointed, broadly obovate, or obcordate winged petiole.

Of a fragrant odor and a strong aromatic bitterish taste. The leaves must be collected from the bitter orange during the summer months, and carefully dried so as to preserve their fine deep-green color and aroma. They must not be confounded with the leaves of *Citrus aurantium*, Riss., the sweet orange, which are easily recognized by their narrow-winged, almost naked, petioles. Diaphoretic, stimulant.

Azedarach—Azedarach—Chinaberry Tree.—The bark of the root of *Melia azedarach*, Lin. Natural order, *Meliaceæ*.

A bark in flattish pieces, six millimeters (quarter inch) in thickness, with a dark-brown epidermis separating easily from the reddish periderm; the white inner bark is fibrous and tough, the loose bast tissue easily separated in thin layers. In the cross-section, when seen under the lens, with fine, wavy, bent striæ; of a peculiar bitter somewhat acrid taste. The bark is to be collected in autumn, and as it rapidly loses its virtues in keeping, it must be employed as recently collected as possible. Anthelmintic, cathartic, slightly narcotic.

Baptisia—Wild Indigo.—The root of *Baptisia tinctoria*, R. Br. Natural order, *Leguminosæ*.

A short, knotty, woody root sending off almost straight and simple branches; main root ten to twenty centimeters (four to eight inches) long, and from the thickness of a quill to that of a little finger, of a pale-brown color, lengthwise deep and wavy wrinkled. The outer bark is thin, the inner bark consisting of a fibrous bast tissue easily separating from the wood, and particularly in the large roots from older plants easily divided in fine fibres. The wood is tough, flexible, of a fibrous fracture, solid and white, and under the lens in the transverse section appears fine radiately striated from the thin medullary rays. Odorless, and of a bitterish, slightly acrid, nauseating taste, which is most prominent in the bark; the wood is almost inert. Febrifuge, antiseptic.

Aqua Camphoræ—Camphor Water.—

Take of Camphor, <i>four parts</i>,	.	.	.	.	.	.	4
Alcohol ("stronger alc."), <i>four parts</i>,	.	.	.	.	.	.	4
Precipitated phosphate of calcium, <i>eight parts</i>,	.	.	.	.	.	.	8
Distilled water, <i>five hundred parts</i>,	.	.	.	.	.	.	500

Dissolve the camphor in the alcohol, triturate the solution with the precipitated phosphate of calcium, then with the distilled water, very gradually added, and filter through a well-wetted filter.

¶ This makes a stronger solution than the formula of the present U. S. Ph. owing to the slight increase in alcohol, whereby the camphor is more thoroughly incorporated with the first portions of the water. The present proportions reduced to weight are: Camphor, 3.78; alcohol, 1; carb. magn., 7.6; dist. water, 460 parts.

Aqua Chlorinii—Chlorine Water.—

Take of Black oxide of manganese, in fine powder, <i>four parts</i>,	.	.	.	.	.	.	4
Hydrochloric acid, <i>twenty-four parts</i>,	.	.	.	.	.	.	24
Water, <i>thirty parts</i>,	.	.	.	.	.	.	30
Distilled water, <i>one hundred and fifty parts</i>,	.	.	.	.	.	.	150

Introduce the oxide into a flask, add the acid, previously diluted with water, *fifteen parts*, 15, and apply a gentle heat. Conduct the generated chlorine, by suitable tubes, through the remainder of the water contained in a small wash-bottle, to the bottom of a bottle having the capacity of *five hundred parts* of water, into which the distilled water has been introduced and the neck of which is loosely stopped with cotton. When the air has been entirely displaced by the gas, disconnect the bottle from the apparatus, and having inserted the stopper, agitate the contents, loosening the stopper from time to time, until the gas ceases to be absorbed. Lastly, pour the chlorine-water into small bottles provided with glass-stoppers, fill them to the neck, so as to exclude all air, close them securely, and keep them in a cool, dark place.

Char.—Chlorine-water is a greenish-yellow, clear liquid, possessing the suffocating odor of chlorine. It instantly decolorizes dilute solutions of litmus, indigo, and other vegetable coloring matters. When shaken with an excess of mercury until the odor of chlorine has disappeared, the remaining liquid, after filtration, should be at most but faintly acid (absence of more than traces of hydrochloric acid).

On adding *one hundred parts* of chlorine-water to a solution, in dilute hydrochloric acid, of 2.25 parts of dry ferrous sulphate, prepared by precipitation with alcohol, the mixture does not decolorize a dilute solution of permanganate of potassium (presence of more than 0.3 per cent. of chlorine). On using 3 parts of dry ferrous sulphate in this test, the mixture, on the addition of solution of ferrocyanide of potassium, assumes a blue color, or shows a blue precipitate (presence of less than 0.4 per cent. of chlorine).

Arsenici Iodidum—Iodide of Arsenic.—

Take of Iodine, in coarse powder, <i>four parts</i> ,	4
Arsenious acid, in fine powder, <i>one part</i> ,	1
Distilled water, <i>fifty parts</i> ,	50

Add the iodine to the distilled water contained in a tall glass cylinder, and by means of an appropriate apparatus pass through it a steady current of hydrosulphuric acid gas until all the iodine has disappeared. Filter the liquid from the separated sulphur, and boil it to expel the excess of the gas. Then pour it into an evaporating dish, add the arsenious acid, and heat until the latter is dissolved. Filter the solution, if necessary, and finally evaporate it to dryness.

¶ This is Mr. James F. Babcock's process, published in the "Proc. Amer. Pharm. Assoc.," vol. xxiii, p. 693. The reaction is the following:

$$\text{As}_2\text{O}_3 + 6\text{HI} = 2\text{AsI}_3 + 3\text{H}_2\text{O}.$$

The product is in orange-red crystalline scales of definite composition, thus having a decided advantage over the present product of the U. S. Ph., and it is capable of combining with its full equivalent of iodide of mercury.

**Benzinum—Benzin.*—Syn.: Æther petrolei, Petroleum ether, Petroleum benzin.

Char.—A colorless, transparent, and highly inflammable liquid, obtained by distillation from American petroleum, and possessing a slight odor of the

latter. When poured drop by drop into the palm of the hand, it evaporates rapidly without leaving any odor. It is not miscible with water, but swims on the surface. Its sp. gr. ranges from 0.670 to 0.675, and it boils at a temperature of 50° to 60° C. (= 122° to 140° F.). When heated for a few minutes with one-fourth of its volume of spirits of ammonia and a few drops of a solution of nitrate of silver, the ammoniacal liquid should not turn brown (absence of foreign pyrogenous products and of sulphur compounds). It is soluble in not less than 6 times its weight of 90 per cent. alcohol (difference from and absence of benzol). On mixing equal parts of fuming nitric acid and benzin in a test-tube, and gently heating, the benzin assumes at most only a faint yellow color (difference from and absence of benzol).

It should be preserved in well-closed vessels, in a cool place, and away from lights or fires.

¶ Should be introduced. To be used in the preparation of charta sinapis, oleo-resins, extr. lactucarii fluidum, etc.

**Carbasus Antisepticus—Antiseptic Gauze.—*

Take of	Resin, in coarse powder, <i>forty parts</i>,	.	.	.	.	.	40
	Castor oil, <i>four parts</i>,	.	.	.	.	.	4
	Carbolic acid, <i>ten parts</i>,	.	.	.	.	.	10
	Alcohol ("strong. alc."), <i>one hundred and seventy parts</i>,	.	.	.	.	.	170
	Gauze-muslin, <i>a sufficient quantity</i>,	.	.	.	.	.	q. s.

Dissolve the resin, castor oil, and carbolic acid in the alcohol. Then immerse in the mixture folded pieces of gauze-muslin, and allow them to macerate for 15 minutes, or until they are thoroughly saturated. Remove the excess of liquid by strong pressure, spread them out horizontally, and as soon as the alcohol has nearly evaporated fold them and preserve them in air-tight boxes.

¶ Antiseptic gauze, prepared by the above method (after Professor Bruns), is equally effective and much more pliable than that prepared by the original process of Lister.

Ceratum Resinæ Compositum—Compound Resin Cerate.—

Take of	Resin, <i>twelve parts</i>,	.	.	.	.	.	12
	Suet, <i>twelve parts</i>,	.	.	.	.	.	12
	Yellow wax, <i>twelve parts</i>,	.	.	.	.	.	12
	Turpentine, <i>six parts</i>,	.	.	.	.	.	6
	Flaxseed oil, <i>seven parts</i>,	.	.	.	.	.	7

Melt them together on a water-bath, strain the mixture through muslin, and stir it constantly until cool.

¶ Cotton-seed oil is preferable to linseed oil in this preparation.

Emplastrum Hydrargyri—Mercurial Plaster.—

Take of	Mercury, <i>three parts</i>,	.	.	.	.	.	.	8
	Olive oil, <i>one part</i>,	.	.	.	.	.	.	1
	Resin, <i>one part</i>,	.	.	.	.	.	.	1
	Lead plaster, <i>six parts</i>,	.	.	.	.	.	.	6

Melt the oil and resin together, and, when they have become cool, rub the mercury with them until globules of the metal are no longer visible. Then gradually add the lead plaster, previously melted, and mix the whole thoroughly together.

**Extractum Malti—Extract of Malt.*

Take of	Malt, in coarse powder, <i>one hundred parts</i>,	.	.	.	.	100
	Water, <i>a sufficient quantity</i>,	.	.	.	.	q. s.

Upon the malt, contained in a suitable vessel, pour cold water, *one hundred parts*, 100, and allow it to macerate for 6 hours at the ordinary temperature. Then add warm water, heated to about 30° C. (or 86° F.), *four hundred parts*, 400, and digest the whole for one hour at a temperature of 65° C. (or 149° F.). Raise the temperature to the boiling-point, and strain with strong expression. Finally evaporate the strained liquid rapidly to the consistence of a thick extract, by means of a water-bath or in a vacuum apparatus.

¶ Some formulas direct maceration and digestion at a moderate temperature, avoiding boiling. Others direct the boiled liquid, after straining, to be mixed with white of egg in the proportion of the white of *one* egg for every pound of malt, again to be boiled and strained, and then to be evaporated. The above formula is no doubt capable of improvement.

Glyceritum Picis Liquidæ—Glycerite of Tar.—

Take of	Tar, <i>one part</i>,	.	.	.	.	.	.	1
	Starch, <i>one part</i>,	.	.	.	.	.	.	1
	Glycerin, <i>nine parts</i>,	.	.	.	.	.	.	9

Rub the starch and glycerin together in a mortar until they are intimately mixed. Then transfer the mixture to a porcelain capsule, and apply a heat, gradually raised to 140° C. (= 284° F.) and not exceeding 144° C. (= 291° F.), constantly stirring until the starch granules are completely dissolved, and a translucent jelly is formed. Then allow it to cool to 65° C. (= 149° F.), add the tar, and incorporate it thoroughly.

¶ This is Mr. Lloyd's improved formula (see "New Remedies," 1879, p. 200).

Hydrargyri Oxidum Flavum—Yellow Oxide of Mercury.—

Take of	Corrosive chloride of mercury, <i>four parts</i>,	.	.	.	.	4
	Solution of potassa, <i>twenty-five parts</i>,	.	.	.	.	25
	Distilled water, <i>a sufficient quantity</i>,	.	.	.	.	q. s.

Dissolve the corrosive chloride of mercury in distilled water, *seventy-five parts*, 75, and pour it, under constant stirring, into the solution of potassa, previously mixed with distilled water, *fifty parts*, 50. After the precipitate has subsided, pour off the supernatant liquid, and wash with distilled water until the washings cease to be affected by a solution of nitrate of silver. Then dry the precipitate on bibulous paper, in a dark place, and preserve it in bottles protected from the light.

¶ The process is somewhat improved, first by increasing the amount of solution of potassa, and then by directing the mercury solution to be poured into the latter in order to prevent the formation of oxychloride.

Hydrargyrum cum Creta—Mercury with Chalk.—

Take of	Mercury, <i>three parts</i>,	.	.	.	.	.	.	8
	Sugar of milk, <i>one part</i>,	.	.	.	.	.	.	1
	Prepared chalk, <i>four parts</i>,	.	.	.	.	.	.	4
	Ether, <i>a sufficient quantity</i>,	.	.	.	.	.	.	q. s.
	Alcohol, <i>a sufficient quantity</i>,	.	.	.	.	.	.	q. s.

Mix the mercury, sugar of milk, and about one-fourth of the chalk in a mortar, of a shape suitable for trituration; moisten the mass with a mixture of *equal parts* of ether and alcohol, and triturate it briskly. Gradually add the remainder of the chalk, dampen the whole occasionally with the mixture of ether and alcohol, and continue the trituration until globules of mercury are no longer visible under a magnifying power of 10 (?) diameters, and the powder is of a uniform gray color, and dry.

¶ Mr. Bibby suggested the use of sugar of milk; the method of dampening occasionally with ether and alcohol is thought to be an additional improvement. The process of "succussion" is unsuited to working on a small scale.

Linimentum Ammoniaë—Liniment of Ammonia.—

Take of	Water of ammonia, <i>one part</i>,	.	.	.	.	.	.	1
	Cottonseed oil, <i>two parts</i>,	.	.	.	.	.	.	2

Mix them.

¶ Cottonseed oil is proposed as a substitute for olive oil, as it makes a much nicer preparation, both in appearance and in odor, when applied to the skin.

Linimentum Calcis—Lime Liniment.—

Take of	Lime water, <i>twelve parts</i>,	.	.	.	.	.	.	12
	Flaxseed oil, <i>eleven parts</i>,	.	.	.	.	.	.	11

Mix them.

¶ Proportion same as at present.

Linimentum Camphoræ—Liniment of Camphor.—

Take of	Camphor, <i>one part</i>,	.	.	.	.	.	.	1
	Cottonseed oil, <i>four parts</i>,	.	.	.	.	.	.	4

Dissolve the camphor in the oil.

¶ Cottonseed oil is a much better solvent of camphor than olive oil, and the resulting product is by far preferable to and nicer than that obtained with olive oil. Cottonseed oil (refined) deserves a place in the United States Pharmacopœia, and can be used to great advantage in many preparations.

Liquor Arsenici Chloridi—Solution of Chloride of Arsenic.—

Take of	Arsenious acid, in small pieces, <i>one part</i> ,	.	.	.	1
	Hydrochloric acid, <i>two parts</i> ,	.	.	.	2
	Distilled water, <i>a sufficient quantity</i> ,	.	.	.	q. s.

Boil the arsenious acid with the hydrochloric acid and with distilled water, *twenty-five parts*, 25, until the arsenious acid is entirely dissolved; filter, wash the filter with a little distilled water, and add enough distilled water to the filtrate to make it weigh *one hundred parts*, 100.

¶ The present strength is:

		Approximation.	
Arsenious acid,	. . 64 grs.	64	1
Hydrochloric acid,	. . 2 f 3	188	2
Final product,	. . 1 pint	7400	115

This proportion has been raised to 1 of arsenious acid in 100, and the same proportion has been adopted in *all* liquid arsenic preparations.

Liquor Arsenici et Hydrargyri Iodidi—Solution of Iodide of Arsenic and Mercury—Donovan's Solution.—

Take of	Iodide of arsenic, <i>one part</i>,	.	.	.	.	.	1
	Red iodide of mercury, <i>one part</i>,	.	.	.	.	.	1
	Distilled water, <i>a sufficient quantity</i>,	.	.	.	.	.	q. s.

Rub the iodides with water, *ten parts*, 10, and when they are dissolved, filter; wash the filter with a little distilled water, and add enough distilled water to the filtrate to make it weigh *one hundred parts*, 100.

¶ Present formula:

		Approximation.	
Iod. mercury,	. . 35 grs.	35	1
Iod. arsenic,	. . 85 grs.	85	1
Final product,	. . 8 f 3	3645	105

This has been changed to 1 in 100. See the preceding.

REPORT OF COMMITTEE ON DRUG EXHIBITION.

YOUR committee have the honor to report that the exhibit of drugs, chemicals, pharmaceutical preparations, druggists' sundries, apparatus, etc., was very comprehensive and attractive. As many of the exhibits embraced several classes of goods a systematic classification is nearly impossible, and hence your committee have determined in such cases to include the entire exhibit in one comprehensive notice.

CHEMICALS.

The exhibit made by *Powers & Weightman* was the largest and most elegant in this class. It embraced samples of nearly all the leading chemicals made by that firm, an especial feature being the cinchona alkaloids and their salts.

G. Mallinckrodt & Co., of St. Louis, made a very large and elegant display of remarkably beautiful chemicals, which were much admired. The marked success of this firm indicates the possibility of successfully establishing chemical laboratories in the interior of the country.

Rosengarten & Sons exhibited a large case of fine chemicals, among which we noted the cinchona alkaloids and their salts as conspicuous and particularly elegant.

McKesson & Robbins, of New York, made a fine display of chemicals, drugs, sugar-coated pills, and other pharmaceutical preparations. We noted in this collection about forty specimens of crude drugs, many of which are rare. We learned further that this firm is now manufacturing sulphate of quinine, fine samples of which were shown, at the rate of 1000 ounces per week. With this exhibit were shown many of the crude implements used in South America.

CRUDE DRUGS AND PHARMACEUTICAL PREPARATIONS.

Messrs. Lehn & Fink, of New York, made the most comprehensive and elaborate display in the hall. It consisted in part of 170 specimens of alkaloids and their salts; 215 specimens of materia medica, embracing many new and rare articles; over 100 specimens of metals, their compounds and other chemicals, together with many other interesting articles, among which we noted a

little gourd containing about 8 ounces of the extract called "curare," or "woorare," the South American arrow poison.

J. G. Steele & Co., of San Francisco, Cal., exhibited 60 specimens of medicinal roots and herbs from the Pacific Slope. Several of them are already familiar articles of the current *Materia Medica*, while others are as yet little known.

Messrs. Merrell, Thorp & Lloyd, of Cincinnati, O., made a fine exhibit of their pharmaceutical products and chemicals, among which large jars of the berberina salts, muriate, citrate, and salicylate were conspicuous. They also showed about 60 samples of California roots and herbs, and about 50 samples of indigenous and foreign drugs, some of which are rare.

Messrs. B. O. & C. G. Wilson, of Boston, made a fine display of choice medicinal herbs pressed. In quality and style these goods seemed to be as nearly perfect as it is possible to present them.

Messrs. H. K. Thurber & Co., of New York, exhibited 20 specimens of crude and powdered drugs, also Japan gelatin made from sea-weeds. This article resembles ordinary fish glue, and is said to be adapted to the same uses. This firm also showed large samples of fossil ceresin, from Russia, which closely resembles ordinary beeswax.

Messrs. Parke, Davis & Co., of Detroit, exhibited about 40 samples of crude drugs, many of which were novel and interesting; also a large assortment of elegant pharmaceutical preparations, embracing fluid extracts, sugar-coated pills, etc. Their gelatin capsules, shown in large quantities, were much admired. They also exhibited Whitfield's beautiful and ingenious machine for rapidly filling capsules.

Messrs. Smith & Vanderbeck, of New York, displayed several large and beautiful specimens of spices, which were much admired. A very large bundle of fine cinnamon bark was particularly conspicuous in this collection.

Messrs. Robert Shoemaker & Co., of Philadelphia, exhibited a dozen samples of finely-powdered drugs.

PHARMACEUTICAL PREPARATIONS.

Mr. E. Lilly, of Indianapolis, Ind., exhibited full lines of sugar and gelatin-coated pills and fluid extracts. All were handsome, but two large cases of compound cathartic pills attracted particular attention.

Messrs. George H. Schafer & Co., of Fort Madison, Iowa, exhibited specimens of fluid extracts, elixirs, etc., of good quality and of handsome appearance.

The Wheeler Chemical Works, of Chicago, exhibited numerous samples of saccharated extracts, which, being a novelty, attracted considerable attention.

Mr. J. F. Hancock, of Baltimore, exhibited a very large variety of medicated lozenges, which appear to be faithfully made.

Messrs. Hance, Brothers & White, of Philadelphia, displayed a large assortment of sugar-coated pills, elixirs, and fluid extracts, all of which appeared to be of good quality and artistically made. This firm also exhibited samples of Hance's drug mill.

Messrs. John Wyeth & Brother, of Philadelphia, exhibited numerous samples of elixirs, compressed pills, chemicals, and dialyzed iron, all of which were handsome in appearance. They also supplied specimens of hot coffee, made extemporaneously from their fluid extract of coffee, concerning which the general verdict was "good."

Messrs. William R. Warner & Co., of Philadelphia, made a fine display of sugar-coated pills, and their new style of shop bottles.

Messrs. W. H. Schieffelin & Co., of New York, made an elegant display of gelatin-coated pills, which were much admired. The coating was very transparent and thin, and very quickly dissolved in the mouth.

Messrs. Seabury & Johnson, of New York, exhibited over a hundred varieties of spread plasters of fine appearance, also carbolated gauze and borated cotton.

The Anglo-American Suppository Co. exhibited numerous samples of gelatin suppositories, which appear to be very serviceable. They also exhibit Stone's cod liver oil.

Messrs. Hall & Rucker, of New York, exhibited hollow cacao butter suppositories, of various sizes, and designed to receive the medicament somewhat like a gelatin capsule.

PERFUMERY AND SUNDRIES.

Messrs. Bazin & Sargent, of Philadelphia, made an attractive display of perfumery, soaps, and other toilet articles.

Mr. Theo. Ricksecker, of New York, displayed a large assortment of druggists' sundries, including soaps, brushes, bandages, etc.; also a line of metric weights and measures, and enamel-labelled shelf bottles, all of which were of superior quality.

Messrs. J. W. Randolph & English, of Richmond, Va., displayed a superb line of druggists' boxes, embracing everything ever required in that line. A paper box, capable of holding even hot kerosene oil without leakage, and designed to contain ointments, was a novelty in this collection.

Messrs. Sheerer & Co., of New York, exhibited a very large variety of mineral waters, embracing all the foreign waters of good repute in this country.

Messrs. Whitall, Tatum & Co., of Philadelphia, displayed a large assortment of samples of their flint glassware. Their goods have no superiors in the country, and cannot have until glass is materially improved.

Messrs. Henry Træmner & Co., of Philadelphia, exhibited samples of balances and weights for every purpose in the line of the chemist and druggist. Their goods are handsome, and appear to be accurate and substantial.

Professor J. P. Remington exhibited a very handsomely made pharmaceutic still.

Mr. Prentice exhibited a small pharmaceutic still, which appeared to work very well.

Messrs. H. Sugden, Evans & Co., of Montreal, exhibited samples of Montserrat lime-juice and fruit cordials.

Respectfully submitted.

H. D. GARRISON,
Chairman.

C. C. SPANNAGEL,
A. R. BAYLEY,
E. L. BOERNER,
J. B. DILL.

SPECIAL REPORTS AND ESSAYS.

I. PHARMACY.

ON THE CONDITIONS NECESSARY TO SUCCESSFULLY CONDUCT PERCOLATION.*

BY J. U. LLOYD, CINCINNATI, OHIO.

A REPLY to this query may at first sight appear easy. On the contrary, the natural laws to be considered, and the various causes dependent upon manipulation that are continually influencing the process, render the subject complicated. Beyond doubt, however, all the discrepancies which manipulators meet in result of work from time to time, and the recorded variations of different operators, are due to causes that may be understood and overcome to a very great extent. Natural laws govern the process of percolation, and to carry on our work so as to make the most judicious application of these laws to the object in view should be the desire of the manipulator. Percolation, as connected with the work of the pharmacist, has of late years become very important. Few appreciate the very great amount of medicine prepared in this manner, and I think it may truly be said that this very interesting part of the business of the pharmacist is overlooked in many instances where money might be saved and leisure time employed.

It is not perhaps altogether the fault of our druggists that the subject is neglected, for to a degree the impression has gradually extended that such articles even as the simple fluid extracts of the pharmacopœia may be prepared upon a large scale better than in the small amounts required by dispensing pharmacists. Be this latter point true or not, to a very great degree the "manufacture" of fluid extracts has passed into the hands of

* In answer to Query 19. Read at the Third Session.

large houses. Another reason, perhaps, for neglect of this branch of the apothecary's business, is the fact that some doubt has arisen as to the comparative values of extracts made by the official process and such modifications as have been recommended. And yet I know that our pharmacists are hard workers, and judging from acquaintances little fear need be entertained that dread of trouble will make the pharmacists of our country shrink from the adoption by the revising committee of the United States Pharmacopœia of any *practical* process for the preparation of fluid extracts, however complicated such process may be. I believe if the apothecary purchases fluid extracts that may easily be made by himself it is in the majority of cases from the above-named considerations. Few that witness the constant application of our druggists to business, from early morning until late at night, will disagree upon this point.

It is desired that the result of the investigations, tabulated in the paper to follow, may assist in throwing a little light upon some of the points we have mentioned and others that are obscure. In many instances old ground is undoubtedly traversed, but it was deemed best to follow the chain of argument, regardless of former investigations. Let it be remembered that these arguments are brought forward and experiments instituted with the object of study in actual laboratory management, and not for the purpose of upholding preconceived opinions. It may be found that some of the points are poorly taken, and others are supported by experiments in which natural laws that exert a very great influence upon the result are overlooked. If such be the case corrections will be thankfully accepted. It is to be hoped that those who criticise will bring forward experiments that will enable comparisons to be made, or at least will designate the points that appear defective. It is also requested that criticisms be confined to the points mentioned in this paper under like conditions only, as no others can be of value. It will be noticed that the experiments brought forward are upon a scale that will enable repetition by every retail pharmacist of the country. Others could have been tabulated, perhaps to advantage, but it is thought a sufficient number are given, and it is hoped that those who think otherwise may be interested, and induced to go over portions of the work while preparing fluid extracts during the year to come. Correspondence upon the subject will be thankfully received and considered.

The opportunity is embraced to especially thank Mr. Charles Mohr for his careful review of the manuscript, and to acknowledge the justice of the majority of his arguments where issue was taken, as that gentleman will notice when enabled to peruse the present paper; also to Professor John M. Crawford for a careful review of the mathematical expressions used in the first portion of the paper. Lastly, it is to be remembered that the writer is looking at this subject with his present light, and deems it a duty to reconsider any point when convinced of error, but claims the privilege to maintain his belief, unless so convinced, whoever may be the dissenter.

One of the most frequent operations to be performed by the pharmacist is to separate from the crude materials, offered principally by the vegetable kingdom, active principles from others inert or not desirable. This object is reached by bringing the same into the liquid state by solution, with the aid of a proper solvent (*menstruum*). Thus we have the process of maceration and percolation, the latter being a modification of the former, calling in the aid of gravitation. To arrive at a proper understanding of the laws which govern the solution of substances, that is, the transfer of a solid into the liquid state through the aid of solvents, we should consider first the greatest agent in percolation,—the attraction of gravitation. This unknown force impels all terrestrial bodies toward a common centre, the centre of the earth.

If we arrest the fall of a solid and pour upon it a liquid, that liquid will flow over the solid, excepting a small amount held by adhesion, and will fall from the lower surface towards the earth. If that solid be impenetrable, and insoluble in the liquid, it will remain intact; if soluble, it will gradually assume the liquid state and disappear. If the solid be porous the liquid will enter. This is due to absorption,—a molecular force, which is working independent of the attraction of gravitation, and overcoming it to a limited degree, thereby exercising a great influence over the process of solution, beneficial inasmuch as it insures a closer and more continued contact between the solvent and the solid. Thus, if a certain amount of liquid be slowly poured upon the porous body, we shall find that attraction of gravitation will fail to detach the liquid from the lower side; it does not flow over the outside but enters, is absorbed, and held within its substance. The attraction of gravitation still exerts itself, for the actual weight of the mass is the

sum of the separate weights of the two bodies. Without further examination we might suppose the materials at rest; such, however, is not the case. There are disturbing elements which produce constant motion; thus, an alteration of temperature will excite a change in the relative position of the molecules of the liquid, and *temperature constantly changes*. But besides the motions of the molecules, caused by the constantly varying changes of temperature, there is osmosis, an attraction that induces currents of liquid through cellular tissue. Gravity, however, overcomes at first all of these various contrary influences,—among which we may class diffusion,—and is ever tending to draw the liquid, most heavily charged with soluble matters, downward through the lighter, and thus there seems to be no rest, but, on the contrary, continual change.

The influences mentioned exert themselves whether the solid be large or small, whether a single particle of dust in a quantity of liquid or an innumerable number placed in a mass and covered with liquid. Let us turn our attention to *solution*. Throwing aside all theories as to the why and wherefore of the change of state from solid to fluid, we must accept the fact, that below the melting temperature certain solids will, to a fixed extent, assume the form of liquids if in contact with particular fluids. The conditions necessary to effect and promote this change are: surface exposed to the dissolving medium, circulation of the liquid, temperature, and time of contact between the surfaces of solid and the liquid. In regard to the first of these conditions, it is invariably found that the rapidity of solution increases with the area of the surface exposed; thus, for an example, if a cubic crystal of bromide of potassium, or any other substance, one inch in dimension, be surrounded with water, the surface in contact with the water will be six square inches. If the crystal be bisected by a plane parallel to any two of its sides, the amount of the material remains the same, but its surface has been increased two square inches. Let each half now be divided into four equal parts, and there will be a total of twelve square inches of surface, exactly twice the amount of the original cube. Division can be theoretically, and in the above instance according to mathematical laws, continued to the extent of our imagination, and each cube divided into eight will double the amount of the surface. But in practice we meet with obstacles of various nature which soon interpose insurmountable limits to accurate divisions, making our

further efforts in that direction impracticable, and the desired increase of surface is most readily effected by pulverizing the solid, thus obtaining irregular surfaces.

In considering the rest of the conditions upon which solution depends we next observe the action of *currents*.

Thus immerse a cubical crystal of bromide of potassium one inch in dimension in water, and its six square inches of surface will be in contact with six square inches of water surface; immediately the two surfaces act together, resulting in the disintegration of the surface of the salt, which assumes the liquid form and blends with the surface of the water in the most intimate manner. This change takes place to a fixed extent, dependent upon the temperature and the saturation of the solvent. If the crystal be at the bottom of a vessel of water it commences most rapidly to diminish in size from the top until finally it disappears. In observing closely the process we notice streams of liquid circulating about the crystal. These currents, colorless and transparent like the surrounding medium, are clearly visible from the fact that they refract the rays of light differently, an optical result caused by the portions of liquids of different densities, for the particles which form the surfaces of the salt unite with those of the water surface, resulting in a compound that has a greater specific gravity than pure water, consequently, as soon as united, this fluid flows over the crystal and down its sides in obedience to the laws of gravitation. It strikes upon the bottom of the vessel and, in response to the law that fluids of different densities seek their own level, spreads out, and in doing so displaces its bulk of water, which rises and replaces the solution about the crystal, and thus continuous currents flow over and down the sides of the crystal, and fresher menstruum is constantly taking the place of that more saturated. We might liken the foregoing to a surface of liquid resolving against a solid, each movement of which wears away the solid and decreases the wearing force of the liquid. At last, if the amount of water be sufficient, the crystal will have disappeared, and at the bottom of the vessel will be found a dense solution at rest surmounted by a lighter one. Again cautiously introduce a crystal of the same salt and the afore-named phenomenon will take place, though in a less marked degree. The circulation of the medium becomes gradually less and less distinct, and finally, if the salt be in excess, disappears. There remains now a remnant of bromide of potassium sur-

rounded by the dense solution, while overlying we find almost pure water. In obedience to what is generally considered another force, which, it is thought, produces the diffusion of liquids, the solution and overlaying water continually but slowly intermingle. At last they are homogeneous, preceding which, however, the remnant of crystal at the bottom of the vessel will have disappeared. The foregoing exemplifies the changes which take place, under like conditions, when the crystal is broken, excepting that the increased amount of surface contact, before considered, hastens the operation. Thus we find that *nature's* laws constantly produce circulation while solution is progressing. Arguing therefrom we should be able to hasten the operation at certain stages and assist nature by frequently stirring the entire liquid, thus mixing the solutions. Recognizing the theoretical value of circulation and extent of surface, when we wish to dissolve substances we should powder them, and stir the liquids at short intervals.

Temperature is most important. With a few exceptions substances dissolve to a greater extent in warm than in cold liquids, and even though the material be scarcely more soluble in the hot menstruum it dissolves more rapidly. This results from the fact that liquids while rapidly changing temperature are in a more rapid state of circulation, and heat also decreases the cohesive attraction of solids, their molecules being more easily detached from the mass, and therefore more readily unite with those of the liquid. Few operators have failed to notice the benefit of a warm room when dissolving substances. Careful manufacturers cannot allow the process of percolation to be conducted at winter temperature, even though so doing results in great saving of alcohol by lessening evaporation (see Tables 1 and 2). *Time* is a consideration of importance. An appreciable amount of contact *must* be allowed between solvent and solid. That solutions require time for action is a principle well recognized and scarcely necessary to mention.

Having now briefly noticed the influences which govern solution, let us consider the relation between maceration and percolation, as these processes are called, bearing in mind the fact that the direct object is the solution of certain substances. Place two ounces of powdered buchu in a vessel and saturate thoroughly with alcohol. Then fit closely on the powder a sheet of blotting-paper, and add alcohol so that the entire amount used is sixteen fluid ounces;

then very carefully remove the paper so as not to disturb the powder. Now we shall have the principles of solution exemplified exactly as in the previous example, excepting instead of one crystal we have a number of very small fragments, and instead of a perfectly soluble material the substance is only partially soluble, and in addition to other forces we have capillary attraction.

Solutions of different densities quickly form throughout the interstices of the powder. These solutions are in constant motion. They are subject to the forces before mentioned, but by the predominating influence of gravitation the constant tendency of the heaviest solutions is downward, and the densest part of the solution constantly seeks the lowest point (see Table 3). Thus we have new surfaces presented between solvent and material, attended in the first place with a handing downward of the dissolved matter. *Apparently*, the liquid and the powder are at rest; *actually*, there is constant motion, and so long as the act of solution progresses the circulation of the menstruum continues. However, these forces cannot extend their influence above the surface of the powder. It may be suggested here that diffusion can effect the mixture (see Table 3). Consequently the liquid within the interstices of the powder may be strongly saturated with dissolved matters, while that just overlying is scarcely contaminated, and near the surface of the vessel is for some time perfectly pure. Assuming now that we desire to transfer the dissolved matter equally to all portions of the liquid, we most easily accomplish the object by stirring the contents of the vessel until the menstruum above and the solution within are thoroughly incorporated. When allowed to rest solution as before proceeds, and when we again stir the contents of the vessel we transfer a certain proportion of dissolved matter to the overlying fluid. Each operation depletes the powder to an extent of soluble matters, and tends to produce an equilibrium between menstruum and material. The process of solution becomes gradually less active, and at last ceases to any perceptible degree, at which point we find the liquid above the powder and the liquid within identical. However long we may allow them to remain together, and however violently they may be agitated, we cannot further deplete the powder without increase of temperature. This is maceration, and thus it is we cannot by maceration represent the powder operated upon, for when the supernatant liquid is filtered from the powder soluble matters in proportion to the liquid within the powder must remain with it. *As the liquid*

obtained is to the entire menstruum, so must the material in the liquid obtained be to the material dissolved by the entire menstruum.

Other inconveniences attend the practical application of this mode of extracting the soluble substances from our plants. A very serious objection is the time required—generally two weeks. This, perhaps, more than any other cause, interested pharmacists in a general endeavor to improve. Another desideratum was an increase of strength in the product. We will consider briefly a slight modification of this process of maceration. Let us carefully moisten two ounces of powdered buchu with alcohol, press firmly into a container, and cover with the same menstruum. The operation of solution will be repeated exactly as in the other example. At length the liquid within the powder, and that in the cavities between its particles will be identical. When this state arrives we remove the material to a press, and obtain all the liquid possible by pressure.

The residuum material is again finely comminuted, macerated with fresh alcohol, and again submitted to pressure; the operation being repeated as many times as is considered necessary. It at first strikes us with reference to this process, that as we constantly remove saturated liquid from the powder, and substitute perfectly pure in its place, we must soon perfectly deplete the powder. But by any ordinary means we cannot remove *all* the liquid, and certainly that held within the powder must contain its full proportion of dissolved matters. Therefore, assuming that it required four ounces of alcohol, and the liquid within the powder and that between the particles had become identical in composition, and three ounces of liquid were obtained (a liberal allowance), one-fourth of the strength must remain in the residuum; consequently the three fluid ounces obtained containing three-fourths of the extractive matter represent one and a half ounce of buchu, or one-half ounce of powder to each fluid ounce, and each of the following operations dilutes this. At each successive step the powder, preceding and following maceration and expression, contains the same amount of liquid, and for every four ounces of alcohol applied, four ounces of solution are obtained, excepting loss by evaporation, which will not be considered here. Decrease in quantity of powder by having a portion of its extractive matter removed by each maceration is also disregarded. The second expressed liquid we find represents but four-fifths of the extractive matters remaining in the powder, that is, four-fifths of one-fourth, which is one-fifth

of the whole, or original quantity, which, added to the three-fourths obtained by the first operation, make the sum of nineteen-twentieths contained in seven fluid ounces of solution, a little less than three-twentieths to the fluid ounce. The first operation produced five-twentieths to the fluid ounce, therefore there is a reduction of a little more than two-twentieths to the fluid ounce by the second maceration. Theoretically this procedure may be carried to infinity before entirely exhausting the material (see Table 4). Practically the exhaustion will not be as thorough as our example represents. From considerations yet to be named, the writer believes it is impossible to obtain an expressed liquid containing substances of the plant capable of being dissolved by the menstruum, in the great proportion between successive percolates indicated by this ideal example. It is invariably found that a tenth maceration will produce an appreciable amount of extractive matter, and when we come to study the constituents of plants and their relations to menstruum, it will be doubtless accepted that such *must* be the case. As the matter stands, those that favor this process cannot well object to the argument and table, inasmuch as it admits of the greatest possible depletion of the powder. Others may, perhaps, with good cause, argue that theoretical proportion of soluble matter extracted will be less than the above upon the assumption that the menstruum and the *inert* portion of the powder are alike impregnated with soluble matter, and that the actual proportion should be between menstruum squeezed from the mixture and entire residuum. Table 5 will give this view of the case, using the same data for calculations employed for Table 4. Another trouble attending this process in practice is the necessity of finely dividing or pulverizing each residue before remaceration, an operation tedious and difficult to accomplish in the majority of cases, especially when large amounts of material are worked. I have never succeeded to my satisfaction in a general way, without passing the residuum through a sieve after each expression, an operation not easily accomplished, especially with substances which agglutinate, although in certain instances the process is preferable to any other. Our aim we understand to be the transference of soluble matter from material to liquid, if possible representing a grain of the material with a minim of the solution. This latter result we have not yet accomplished, and cannot by either process of maceration examined. In the first case we operate directly against

the laws of nature. We are continually transferring a dense solution upward. In the latter example we neglect to take advantage of nature's greatest force. We use manual labor to accomplish, in the way of separating the liquid, what gravitation will do for us to any extent, and better in every particular. Now let us modify the operation by repeating the experiment of maceration exactly as heretofore, but in a vessel with a layer of cotton at the bottom, and an exit below, care being taken to avoid stirring the powder. After the usual maceration, cautiously open the exit and allow the liquid to escape at the very bottom of the powder. As a consequence we obtain the densest liquid at first, and substitute in its stead at the surface perfectly fresh menstruum, with the advantage that the liquid extracted has always passed through the entire material. Thus we find the product is constantly decreasing in color and flavor, and the powder is continually submitted to the action of a moving menstruum.

We use no manual labor after preparing the apparatus, and have no pressed residue to pulverize. We simply connect maceration as before examined to one of nature's most familiar laws, and in this latter experiment have an exemplification of the process which Professor Procter recommended for the preparation of fluid extracts and tinctures. It is only a modification of the processes previously examined, differing in the manner in which the liquid is separated from the powder. It is simple in operation, easy in manipulation, and productive of satisfactory results when properly applied. It is called percolation, under which name we shall perhaps be led to examine some points of interest connected therewith, and some modifications which have been suggested as improvements over Professor Procter's process, very properly denominated *simple percolation*.

Professor Procter in bringing before pharmacists this process to deplete a powder of soluble matters laid no claim to originality, excepting in the application of the principle for the purpose of making tinctures and fluid extracts. He certainly was aware that the process had been in use, for a similar process was recommended by Count Rumford for preparing coffee; and in 1817 Mr. C. Johnson applied the principle to the extraction of cinchona bark, saying: "The machine I use is similar to one made several years ago by Edmund Loyd & Co., 178 Strand, and does not differ essentially from any of those described in Count Rumford's eighteenth essay, and in the 'Repertory of Arts'

for April and May, 1813." Of the practical application of the process Mr. Johnson remarks, "that in the Lancaster Public Dispensary this method is found to afford a better preparation than was formerly obtained from twice the quantity of cinchona." (Annals of Phil., vol. ix, p. 451.)

I am informed by Mr. Charles Mohr that Mr. Pelouze, as early as 1834, introduced percolation into the laboratory of the chemist in his method of preparing tannic acid, calling it "extraction by the process of displacement." Virtually, percolation had been employed for ages before with civilized and even partly barbarous nations, as, for example, in making saltpetre and potash. Yet, while the idea was not *new*, its application to the preparation of tinctures and fluid extracts was original, as far as I can learn, and thus we are as much indebted to Professor Procter as though the principle for separating soluble from insoluble matters was new in the world's history.

Professor Procter, by bringing forward this simple process and simple form of apparatus for the preparation of tinctures and fluid extracts, decreased the labor, the time, and the expense. The memory of Professor Procter will ever be dear to American pharmacists, as well as to those across the Great Water. His field of labor was a wide one, and yet, perhaps, we are more indebted to him for adapting the process of simple percolation to pharmaceuticals than the majority of us are apt to imagine. We cannot value his gift too highly; beautiful as it is in its simplicity, it is not less valuable than simple.

In conducting percolation, the object being the preparation of fluid extracts, many points are essential other than the considerations mentioned heretofore. Of those the most essential to be considered are the vessel employed, the material operated upon, the menstruum used, and the manner of manipulation. Accepting the argument that percolation is for the economical extraction of soluble materials, it is of the utmost importance to study influence of contact between the menstruum and the material whose partial solution is to be effected, as we have already seen that contact, continued for a length of time, is of first necessity. Thus, if we place a pound of powdered sugar, or any other soluble substance, within a cylindrical percolator of such diameter that the space occupied is one inch in height, and cautiously add, evenly upon the upper surface, diluted alcohol, admitting for the sake of argument that the menstruum passes evenly and reg-

ularly through the powder, the diluted alcohol in the first of the percolate will have been in contact with one inch of material. That which follows will have successively less material to operate upon, for the first portions of percolate are partly made up of dissolved sugar or extracted matter. Thus each preceding portion of the percolate lessens the material in the percolator, and lessens the height, thus decreasing the contact of any that may succeed, until finally only a thin layer of sugar remains, between which and the passing menstruum the contact is very slight indeed. At last the sugar disappears. For this reason, even where the material is completely soluble, our percolate should theoretically become less and less charged with dissolved matters as percolation progresses (unless it be saturated to a certain point of the percolate), and at last a comparatively large amount of menstruum should contain but a small amount of dissolved material. In connection with the above argument Tables 6 and 7 may be introduced.

Let us now imagine a like amount of powdered sugar in a percolate of less diameter. The height will be increased and the contact between the first part of percolate and powder will be greater in proportion to the increased height. Allowing, for argument, the material to occupy eight inches in height, it will follow that the menstruum of the first portion of percolate will have passed through eight times the height of sugar that the corresponding portion did in the former experiment, although the real amount of sugar was the same. Now, again, we have the afore-mentioned rule regarding decrease of contact. Each successive part of the percolate lessens the sugar in the percolator, and decreases the possible contact (with sugar) of all the menstruum that may follow, and under like motion of liquid the sugar decreases in each succeeding part of the percolate. It will be seen that, theoretically, each portion of the menstruum in the smaller percolator must have greater contact with the material than the corresponding menstruum of the larger, if both percolate with the same rapidity, although in both examples we operate upon similar amounts of material. Arguing therefrom we are induced to anticipate that unless the percolate from the percolator of greater diameter is saturated with sugar, that which corresponds from the smaller will contain more dissolved matter, for after one inch—the depth of sugar in the percolator of greatest diameter—is passed there remains in the smaller *seven inches of contact* dur-

ing which solution may progress. Calculating accordingly we may expect that if we spread a pound of sugar so that it will occupy a depth of one inch in a percolator, and percolate through it diluted alcohol enough to produce sixteen fluid ounces of percolate, we will fail to obtain as much sugar in solution as though the sugar had been placed in a vessel of less diameter, thereby increasing the contact between menstruum and sugar. Applying the same rule to larger and smaller amounts of other substances, we must conclude that unless there be counterbalancing influences the amount of dissolved matter in a percolate must increase and decrease with alteration in the height of powder, other conditions being identical, and amount of percolate passing from each in a given time. In connection with this portion of the argument I will invite attention to Tables 6, 7, 8, 9, 10, and 11, in which temperature, rapidity of percolation, and menstruums of corresponding examples were identical.

Let us not infer, however, that the conditions cannot render the foregoing to an extent inaccurate. If our material be placed loosely in the percolator as a consequence the first portion of menstruum will pass rapidly. If after the first fraction of percolate is obtained the flow be retarded by means of a stopcock, that which follows may be held in contact with the material some time longer than the first; after the second fraction is reserved the flow may be again retarded, and thus more actual contact of time induced between menstruum and material than was obtained at first, although there is continually less material within the percolator. With some substances another benefit to be derived by the latter percolates arises from the fact that if the material be not finely divided or pressed firmly into the percolator the first portion of percolate flows over the particles and through the interstices between, thus preventing the menstruum flow coming into close contact with soluble materials. Gradually, however, the material may absorb menstruum, and expanding fill up those interstices, thus forcing the passing percolate to seek more and more the capillary passages through the material, and thus give a larger amount of dissolved material to a portion of percolate succeeding a certain amount of the first. To an extent this result may occur from a somewhat similar cause, even with materials perfectly soluble in the menstruum, as, for an example, sugar or salt. With small amounts of loosely packed granulated sugar the first part of a percolate of diluted alcohol or water

quickly finds the exit of the percolator, but the surfaces of the particles are in the meantime softened and the mass contracts. The interstices become filled with thick syrup or solution, and thus the percolates that follow are for a time retarded (see Tables 12 and 13). It will be noticed that the foregoing discrepancies result simply from imperfect contact, or, as we may say, imperfect maceration.

We will now consider another phase of the subject. Will a certain amount of material, occupying a height of ten inches, yield to corresponding portions of percolate *less* dissolved matter than a smaller amount in a percolator of such size as to make the height twenty inches? If we accept the foregoing arguments we must conclude this will be the case to a certain point of the operation, unless the percolate from each percolator is saturated, as each drop of menstruum passing through the one will come into contact with a larger portion of material than that from the other, until a certain amount of soluble matter is carried from the smallest amount of material, when it will naturally follow that the percolate from the largest amount of material will contain more dissolved matter. In other words, the first portion of percolate from the material, occupying the greatest height, will excel the other, while afterward the case will be reversed. Perpendicular height should govern to this extent the result from this standpoint regardless of quantity. For the greatest contact between powder and menstruums, moving with like rapidity, must be where there is greater height of powder regardless of *breadth*. Thus we are brought to Tables 14 and 15 in which corresponding parts of percolates are tabulated.

In considering now that phase of contact between menstruum and solid, called maceration, in connection with percolation, one cannot find any influence at work arising from a force other than those simply due to a prolongation of contact before considered. The passing menstruum is retarded, thus permitting a longer time for the action of the solvent. In treating of this entire subject let us bear constantly in mind that our aim is to dissolve solid substances, and that the various modifications of the processes are simply influences affecting solution.

If we close the exit of our percolator at any time during the progress of percolation the menstruum within the percolator will necessarily cease to move bodily downward. The liquid will thus remain in direct contact with the material, and as a conse-

quence the act of solution will progress in a manner similar to that exemplified by our example of the dissolving crystal of bromide of potassium. Hence, it is evident that no other advantage than those resulting from longer continued contact can arise. To guard against any disturbing influence affecting succeeding percolation, caused by an unequal contraction of the only partially saturated powder, it is to be observed that all particles of material are equally and permanently surrounded by menstruum. We must bear in mind that the action of the menstruum upon the powdered material in the percolator, which consists of a number of small fragments, and that upon the single crystal of bromide of potassium, in the example cited heretofore, differ only in degree; its solvent power affects alike all the molecules exposed to its influence, and the relative difference is dependent solely upon the difference of the areas of surface exposed to contact. In fact, the term molecule implies no definite idea of size, and is an expression applying to something beyond our senses; we cannot compare the molecules of a liquid to particles of matter of any conceivable size. We are forced to assume that a menstruum is made up of an inconceivably large number of infinitely small particles, which we consider capable of permeating the powder within the percolator, finding its way through the capillary channels which surround the particles of the solid, circulating around them in obedience to laws already considered, and according to influences yet to be mentioned. During the process of maceration in the percolator the capillary tubes, as well as the larger interstices, are supposed to be filled with liquid; if this liquid be capable of dissolving wholly or partially the solid solution must take place. Each successive movement of contact is found to decrease the quantity of matter held in solution until the liquid is saturated or the solid dissolved. Thus we find the effect of contact in percolation identical with that in simple maceration.

In percolation, from the instant the stratum of menstruum commences to penetrate the material until it escapes we have maceration connected with alteration of the position of the mass of the liquid. There are continually new surfaces of contact formed as the liquid passes downward towards the exit of the percolator, and in maceration this phenomenon is also presented. There is no rest within the vessel while solution progresses. Mediums of greater specific gravity than the original menstruum

are constantly forming, which, obedient to gravity, seek the lowest portion of the vessel, in turn to be displaced by heavier liquids. In this way during maceration numbers of percolating currents are flowing throughout the capillaries, and between the interstices of the material, as in percolation, while fresh portions of liquid are continually coming into contact with new surfaces, and saturations are giving way with perfect regularity to those not saturated.

Thus circulation of currents progress and will continue until an equilibrium is established, as long as there is soluble matter and unsaturated menstruum within the percolator, and afterward whenever the temperature is permitted to change. Therefore maceration cannot be disconnected from percolation, and as we have seen percolation must include maceration. And thus I am led to understand that the contact of maceration and the contact of percolation are identical. Reasoning from the foregoing it may be argued that the expression, maceration in connection with percolation, is simply an expression to imply prolonged contact of liquid with material, by which means we may overcome a defective contact of height of material within the percolator. Upon the other hand, increase of height of powder may imply prolonged maceration of the material with successive portions of menstruum. I think we may be justified in arguing that the influences which modify contact are of vital interest in the study of percolation; that the solvent action of a percolating menstruum may be facilitated by judicious maceration, or by increasing the perpendicular height of the powder. Let us now consider the vessel which contains the material known as the *percolator*. This is of the utmost importance, as the increase and decrease of diameter governs capacity, subservient to mathematical laws, which it is necessary to examine.

The percolator controls the height of powder under like pressure. As the diameter of the percolator decreases it is responded to by greater, and as it increases by less height, both of powder and menstruum. Thus, if a cylindrical percolator be six inches in diameter, and a given amount of liquid or powder occupy a height of six inches, the same material will occupy

18½ inches in height in a percolator 4 inches in diameter.						
24	"	"	"	8	"	"
54	"	"	"	2	"	"

This is in conformity with the mathematical law that *the height of both liquid and powder increase inversely as the square of the diameter of the percolator*; a rule, however, which does not apply to the increase and decrease of the resultant contact between the material and passing liquid, as a more careful examination will illustrate.

Let us represent contact by numbers. If a cylindrical or prismatic percolator be used which has been filled one inch with a powder, overlying which is alcohol to the depth of an inch, it is evident that every particle of the powder which assists to form any perpendicular line or column of the powder an inch in height, will be exposed to and come into contact with every collection of molecules in the line or column of alcohol perpendicular above, providing the alcohol passes directly through the powder from top to bottom. If we knew the number of particles of powder and the number of molecules of alcohol in their respective columns, by multiplying the numbers together the product would represent the individual contacts between particles and molecules. As before remarked, we cannot calculate the number of molecules in a given bulk, therefore we will simply call the inch of alcohol and the inch of powder *one*, and thus by multiplying one by one we have the product one, which we will take as unity. If the powder be two inches in depth and the alcohol be one, or if the alcohol be two inches in depth and the powder one, the contact will be twice as great ($2 \times 1 = 2$), and may be represented by two. If both are two inches in depth, the contact will be ($2 \times 2 = 4$) twice as great as the last, or four times that of the first, and may be represented by four, and so on. Let us now take a percolator, and apply the foregoing law of increase of contact. For the sake of obtaining even numbers we will consider a square prism instead of a cylinder, as the principle applies alike to either, although in practice cylindrical percolators are employed.

The area of the base of a square prism 16 inches in diameter is 16×16 or 256 square inches. If a powder properly moistened for percolation be placed in it to the depth of one inch, above which rests an inch of alcohol, there will be 256 cubic inches of each layer, and yet being taken as unity when the alcohol has passed through the powder the contact will be $1 \times 1 = 1$, and thus the contact may only be represented by one. If a square prism 8 inches in diameter be considered, the area of the base will be

64 square inches. If filled with powder to the depth of one inch, over which rests an inch in depth of alcohol, each layer will contain 64 cubic inches of material, or one-fourth the amount required to fill the 16-inch percolator one inch in depth. The 8-inch percolator would therefore have to contain 4 inches in depth of each alcohol and powder before the amount (256 cubic inches) could be reached. Thus the contact will be $4 \times 4 = 16$.

A prism 4 inches in diameter must be filled 16 inches in depth with both alcohol and powder to contain 256 cubic inches of each material. The contact will consequently be $16 \times 16 = 256$. Thus continuing our calculations, we have the following table which expresses the contact between material and liquid, in each instance the percolator below being one-half the diameter of that above:

Percolator 16 in. in diameter, alcohol and powder each 1 in. deep, contact, 1							
"	8	"	"	"	4	"	16
"	4	"	"	"	16	"	256
"	2	"	"	"	64	"	4,096
"	1	"	"	"	256	"	65,536

It will be seen that with the percolator one inch in diameter there will be 65,536 times as much contact between alcohol and powder, inch for inch, as in the 16-inch percolator. Thus we find that whereas the *height* of both liquid and powder increases inversely as the square of the diameter of the percolator, the *contact* between liquid and powder increases *inversely as the fourth power of the diameter of the percolator*.

As we follow a line of experiments, the solution or partial solution of one problem brings us face to face with others. Thus we are led onward, and the more thorough our study of the present, the more important we find it to carefully note the future. The utmost caution is necessary in studying nature's laws, lest from insufficient data we hastily generalize. The foregoing argument regarding the laws of contact is undoubtedly as accurate, from a theoretical view, as those of the mathematical increase and decrease of the capacity of the percolator. In practice, however, the advantage derived from increased contact of height between liquid and powder, is not by any means as great as the foregoing calculations indicate, and as our tables have shown. Counteracting agencies overcome to a very great extent the theoretical advantages contact should afford. Some of these influences we have been led to consider, others have yet to be

mentioned. Let us not forget that every effect has a cause, that variations in the result of percolations are due to the working of natural laws.

We shall now consider the material to be exhausted of which the U. S. Pharmacopœia speaks as follows :

"As different degrees of fineness are necessary in powders, according to their nature and mode of treatment, the special degree required is designated in the several formulas. For this purpose the terms very fine, fine, moderately fine, moderately coarse, and coarse are used ;—the powder passed through a sieve of eighty or more meshes to the linear inch, being designated as *very fine* ; through one of sixty meshes, *fine* ; through one of fifty meshes, *moderately fine* ; through one of forty meshes, *moderately coarse* ; and through one of twenty meshes, *coarse*."

Seven articles, coarsely ground, moistened, and packed into different-sized percolators, during the month of January, and allowed to macerate 48 hours, then drawn in stream size of pin until liquid ceased to pass. Temperature averaged 38° F.

TABLE I.

Menstruum.		Amount used to moisten material		Menstruum added.		Amount of Percolate obtained.		Absorbed by the material and lost by evaporation.		Dry extractive matter contained in the ce		Amount of extractive matter contained in one fl. oz.		Amount of extractive matter contained in 16 fl. oz.	
		Pts.	Pts.	Pts.	fl. oz.	Pts.	fl. oz.	Pts.	fl. oz.	Gr.	Gr.	Gr.	Gr.	Gr.	Gr.
Alcohol.	1 1/2	3	12	11	8	3	8			.41	12.095	193.52			
Alcohol.	1 1/2	3	12	9	14	6	2			1.00	29.5	472.16			
Alcohol.	1 1/2	2	12	9	11	4	5			.41	12.095	193.52			
Alcohol 3.	1 1/2	4	19	14	13	8	8			1.22	35.90	575.84			
Water 2.	1 1/2														
Alcohol 3.	23 1/2	1	9	5	14	4	2			1.75	51.623	826.00			
Water 2.	23 1/2														
Alcohol 3.	21	2	8	5	8	4	8			1.84	54.28	868.48			
Water 2.	21														
Alcohol.	18 1/2	2	8	6	9	3	7			.70	20.65	330.40			

Like amounts of material were at the same time, from the same source, nicely wrapped and placed in a dry situation until August, then percolated, each article being worked in the percolator used in January for the corresponding part. The same amount of

menstruum was used for moistening each individual article, and in every way precautions were taken to render the two lines of experiments as nearly as possible alike. The result is tabulated under:

TABLE II.

	Amount of dry extractive matter contained in one cc. of tincture, obtained from the reserved part of materials percolated in August.	Amount of dry extractive matter contained in one fl. oz. of tincture, obtained from the reserved part of materials percolated in August.	Amount of dry extractive matter contained in 16 fl. oz. of tincture, obtained from the reserved part of materials percolated in August.
COARSE GROUND.	Gr.	Gr.	Gr.
Mayapple root.....	.87	25.665	410.64
Leptandra.....	1.94	57.23	915.68
Hydrastis.....	.84	24.78	396.48
Hamamelis leaves.....	1.24	36.58	585.28
Mayapple root.....	2.11	62.245	995.92
Hydrastis.....	2.63	77.585	1241.36
Aletris.....	.94	27.78	443.68

TABLE III.

Eight glass tubes, one-half inch diameter, and ten inches long, were carefully sunk into alcohol until a little more than half filled, then the lower orifice was corked. A plug of cotton was now thrust from the top until an inch below the alcohol. Different powders were then poured into the tubes until even with the surface of the alcohol. Each powder was then covered with a plug of cotton, the tubes filled with alcohol, corked, and placed in a quiet position. In six months the liquids below and above were identical in appearance. In every case the lower liquid was first colored. Experiments with larger amounts were much more striking.

Aconite.—Yellowish stratum appears at bottom of tube in 2½ hours. Entire lower liquid yellowish in 20 hours. Upper transparent.

Helonias dioica.—Lower liquid tinged in 20 hours, increasing to yellow in 34 days. Upper transparent.

Blue Flag.—Lower liquid yellow in 30 hours, increasing to dark-yellow in 32 days. Upper transparent.

Tamarac Cones.—Lower liquid reddish in 4 hours, blood-red in 20 hours. Upper slightly pink in 30 days.

Mayapple.—Lower liquid yellow in 20 hours. Upper slightly tinged in 34 days.

Bloodroot.—Lower liquid tinged in 4½ hours at bottom, reddish-yellow throughout in 20 hours, increasing in color for 32 days, when it is a dark yellowish-red, and upper liquid is yellowish.

Black Cohosh.—Lower liquid yellowish in 20 hours. Upper transparent.

Lobelia Herb.—Lower liquid contains greenish-yellow stratum at bottom in 2 hours; greenish-yellow throughout in 20 hours. Upper liquid slightly tinged in 40 hours. Lower liquid brownish-yellow in 34 days. Upper yellowish.

TABLE IV.

No. of macerations.	Fl. oz. of liquid obtained by each maceration.	The part of the entire extractive matter of the powder contained in each ¼ oz. of the liquid.	Total fl. oz. of liquid obtained.	Total part obtained of the entire extractive matter contained in the powder.	The part of the entire extractive matter of the powder contained in each fl. oz. of the entire liquid.	Decrease of extractive matter in each fl. oz. of the liquid, occasioned by the addition of the liquid obtained by the last maceration.	The part of the entire extractive matter remaining after each maceration.
1st.	2	.25	2	.75	.25		.25
2d.	2	.05	4	.95	.1357		.05
3d.	2	.01	6	.99	.09	.1143	.01
4th.	2	.002	8	.998	.06653	.02347	.002
5th.	2	.0005	10	.9995	.05261	.01392	.0005
6th.	2	.00006	12	.99992	.04347	.00914	.00006
7th.	2	.00002	14	.99998	.03708	.00644	.00002

TABLE V.

No. of macerations.	Fl. oz. of liquid obtained by each maceration.	The part of the entire extractive matter contained in the powder obtained by each maceration	The part of the entire extractive matter of the powder contained in each fl. oz. of the liquid.	Total fl. oz. of liquid obtained.	Total part obtained of the entire extractive matter contained in the powder.	The part of the entire extractive matter of the powder contained in each fl. oz. of the entire liquid.	Decrease of the extractive matter, in each fl. oz. of the liquid, occasioned by the addition of the liquid obtained by the last maceration.	The part of the entire extractive matter remaining after each maceration.
1st.	2	.6	.6	2	.6	.6		.6
2d.	2	.26666	.06666	4	.86666	.12381	.07619	.13333
3d.	2	.08889	.02222	6	.95555	.08686	.02895	.04444
4th.	2	.02963	.00741	8	.98518	.08568	.02118	.01482
5th.	2	.00988	.00247	10	.99506	.05237	.01331	.00494
6th.	2	.00329	.00082	12	.99835	.04341	.00896	.00163
7th.	2	.0011	.00028	14	.99945	.03702	.00639	.00055

Each experiment consisted of twenty-four troy ounces of granulated sugar, packed with like pressure into cylindrical percola-

tors. Height occupied by experiment No. 7 five inches. Height occupied by experiment No. 6 one inch. Menstruum, diluted alcohol. Rapidity of percolation uniform with both experiments, both being conducted simultaneously.

TABLE VI.

Percolate.	Grains of sugar obtained from one cc. of percolate.	Grains of sugar contained in each percolate of 8 fl. oz.
1st.	8.87	2093.32
2d.	8.74	2062.64
3d.	8.67	2046.12
4th.	5.99	1413.64
5th.	3.58	844.88
6th.	.04	9.44

TABLE VII.

Percolate.	Grains of sugar obtained from one cc. of percolate.	Grains of sugar contained in each percolate of 8 fl. oz.
1st.	5.38	1269.68
2d.	4.48	1077.28
3d.	3.31	781.16
4th.	2.46	580.56
5th.	1.93	455.48
6th.	1.73	403.56

Each experiment consisted of sixteen troy ounces of powdered (dusted) *Leptandra Virginica*, moistened with alcohol, and packed in different-sized cylindrical percolators with like pressure, the percolation being afterward conducted with the same menstruum. Height of powder experiment No. 8 was five and a fourth inches. Height of powder experiment No. 9 was one and a fourth inch. The percolations were conducted simultaneously. Percolates were passed as nearly as possible with uniform rapidity, and every precaution was taken to secure identical conditions of both.

TABLE VIII.

Percolates.	Grains of dry extractive matter obtained from one cc. of percolate.	Grains of dry extractive matter contained in each percolate of two fl. oz.
1st.	3.92	231.28
2d.	3.20	198.80
3d.	2.37	139.88
4th.	1.80	106.20
5th.	1.29	76.11
6th.	.93	44.87
7th.	.63	37.17
8th.	.40	23.60
9th.	.34	20.06
10th.	.25	14.75
11th.	.25	14.75
12th.	.23	18.57

TABLE IX.

Percolates.	Grains of dry extractive matter obtained from one cc. of percolate.	Grains of dry extractive matter contained in each percolate of two fl. oz.
1st.	2.18	128.62
2d.	2.04	120.36
3d.	1.76	103.84
4th.	1.49	87.91
5th.	1.20	70.80
6th.	.98	57.82
7th.	.94	55.46
8th.	.72	42.48
9th.	.61	35.99
10th.	.40	23.60
11th.	.47	27.73
12th.	.43	25.37

Each experiment consisted of eight troy ounces of *Alstonia constricta* in fine (dusted) powder, moistened with alcohol, and packed in different-sized cylindrical percolators with like pressure, the percolation being afterward conducted with alcohol. Height of powder of experiment No. 10 was five inches. Height of powder of experiment No. 11 was one and one-fourth inch. The experiments were conducted simultaneously. Percolates were passed with uniform rapidity as nearly as possible.

TABLE X.

Percolates.	Grains of dry extractive matter obtained from 1 cc. of percolate.	Grains of dry extractive matter contained in each percolate of 2 fl. oz.
1st.	1.76	103.84
2d.	.93	54.87
3d.	.49	28.91
4th.	.24	14.16
5th.	.22	12.98
6th.	.14	8.26
7th.	.16	9.44
8th.	.13	7.67
9th.	.16	9.44
10th.	.12	7.08
11th.	.13	7.67
12th.	.12	7.08
13th.	.10	5.90
14th.	.10	5.90
15th.	.07	4.13
16th.	.11	6.49

TABLE XI.

Percolates.	Grains of dry extractive matter obtained from 1 cc. of percolate.	Grains of dry extractive matter contained in each percolate of 2 fl. oz.
1st.	.73	43.07
2d.	.68	40.12
3d.	.47	27.73
4th.	.36	21.24
5th.	.28	16.52
6th.	.24	14.16
7th.	.17	10.03
8th.	.15	8.85
9th.	.16	9.44
10th.	.17	10.03
11th.	.13	7.67
12th.	.14	8.26
13th.	.12	7.08
14th.	.09	5.31
15th.	.11	6.49
16th.	.11	6.49

Each experiment consisted of sixteen troy ounces of chloride of sodium, in coarse powder, packed with like pressure, in different-sized cylindrical percolators. No. 12 occupied three and a half inches in height. No. 13 occupied seven-eighths of an inch in height. Water was the menstruum. The percolates were reserved in fractions of eight fluid ounces. The experiments were conducted simultaneously, and every precaution taken to secure uniformity, but the percolates were permitted to pass naturally and freely.

TABLE XII.

Percolates.	Grains of salt obtained from 1 cc. of percolate.	Grains of salt contained in each percolate of 8 fl. oz.
1st.	4.89	1154.04
2d.	4.91	1158.76
3d.	4.97	1172.92
4th.	4.43	1045.48
5th.	3.05	719.80

TABLE XIII.

Percolates.	Grains of salt obtained from 1 cc. of percolate.	Grains of salt contained in each percolate of 8 fl. oz.
1st.	4.89	1154.04
2d.	4.90	1156.40
3d.	4.91	1158.76
4th.	4.00	944.00
5th.	2.76	651.36

TABLE XIV.

Eight troy ounces of coarse-ground Ergot. Height of powder, four and a half inches. Menstruum: alcohol, one; water, three.	One cc. contains dry extractive matter.	Total percolate contains dry extractive matter.
1st percolate, 1 fl. oz.	4.76	140.42
2d " " "	8.59	105.905
3d " " "	2.91	85.845
4th " " "	2.26	66.67
5th " " "	1.76	51.92
6th " " "	1.47	43.865

TABLE XV.

Sixteen troy ounces of coarse-ground Ergot. Height of powder, one and three-fourth inches. Menstruum: alcohol, one; water, four.	One cc. contains dry extractive matter.	Total percolate contains dry extractive matter.
1st percolate, 1 fl. oz.	2.85	84.075
2d " " "	2.76	81.42
3d " " "	2.66	77.97
4th " " "	2.64	77.88
5th " " "	2.59	76.405
6th " " "	1.58	46.61

THE PREPARATION OF DILUTED ALCOHOL (SPECIFIC GRAVITY 0.941) FROM ALCOHOL OF ANY STRENGTH.*

BY PROFESSOR WILLIAM T. WENZELL.

IN conformity with the idea of abandoning all measures of capacity for parts by weight in the forthcoming Pharmacopœia, it is no more than proper that the same principle should be extended to the making of diluted alcohol. As it appears to be impossible to obtain in the market, at all times, alcohol of definite strength, the only way to meet this difficulty is to reduce

* Read at the Fourth Session.

the alcohol, whatever its strength may be, in accordance with its absolute alcohol strength.

Having had this idea in my mind, together with your proposition to get at some simple figures by which alcohol and water can be mixed by weight, I have constructed a table by which alcohol of any strength, from 0.817 to 0.863 at 60° F., can be reduced to alcohol of 0.941 at the same temperature in parts by weight, and the simplest proportion (in whole numbers).

This table is constructed upon a table given in the U. S. Dispensatory, p. 86, which gives the percentage composition by weight of alcohols of varying strengths.

Reference to this table shows that an alcohol of sp. gr. 0.835 at 60° F. contains: alcohol, by weight, 85 parts; water, 15 parts.

The same table shows that alcohol of sp. gr. 0.941 at 60° F. is composed of: alcohol, by weight, 39 parts; water, 61 parts.

From these data hence the following equation:

$$39 : 61 :: 85 : x \qquad x = 133, \text{ answer.}$$

From this it seems that 85 parts, by weight, of absolute alcohol contained in 100 parts, by weight, of 0.835 alcohol will require 133 parts, by weight, of water for conversion into a spirit of 0.941, but the 100 parts of 0.835 alcohol contain already 15 parts, by weight, of water. On subtracting this amount from the quotient obtained by the equation the remainder will give the actual amount of water, by weight, required ($133 - 15 = 118$).

Subsequent experiments made by mixing quantities, by weight, of alcohol and water, as deduced by the foregoing calculation, and taking the sp. gr. of such mixtures at 60° F. gave approximately exact and satisfactory results. For my guidance in these experiments I have adopted the following rule:

Rule.—Multiply the percentage amount of alcohol contained in the given alcohol by the given quantity, and place in the product a decimal point two figures towards the left. Then multiply this product by the percentage amount by weight of water contained in the required alcohol, and divide the product by the percentage amount by weight of alcohol contained in the required alcohol. Finally, subtract from the last quotient the quantity obtained by multiplying the percentage amount by weight of the water contained in the given alcohol by the given quantity of alcohol, placing in the product a decimal point two figures towards the left, and the remainder will be the amount of water

by weight to be added to the given quantity of the given alcohol.

Example :

How much water is required to convert ten pounds of alcohol of sp. gr. 0.835 at 60° F. to an alcohol of sp. gr. 0.941 at 60° F.?

$$85 \times 10 = \frac{8.50 \times 61}{39} = 13.8$$

$$15 \times 10 = \frac{1.5}{11.8, \text{ answer.}}$$

But the numerical relations between 10 and 11.8 are by no means simple, at least not sufficiently so for our purpose. I have found that on taking the quantities obtained in this manner and viewing them in the light of vulgar fractions, and then converting these into decimal fractions, I have in some instances obtained simple figures at once, and when I failed by this procedure the end was then accomplished by multiplying each respectively, the numerator and the denominator of the decimal fraction by such and the same number until figures were obtained which gave approximately the simplest numbers.

Example :

The quantities obtained in the foregoing calculation, if placed as a fraction, is as follows :

$$\frac{\text{Alcohol, 10.00}}{\text{Water, 11.80}} \text{ converted to decimal fraction} = \frac{84745}{100000}$$

These figures are as remote from being simple as are the figures of the preceding vulgar fraction. On multiplying the quantities of the decimal fractions with 2, then 3, and so on it was not until the arrival to figure 13 that numbers were obtained and accepted as being satisfactory :

$$\frac{84745}{100000} \times \frac{13}{13} = \frac{11.016}{13.000} = \frac{11 \text{ alcohol.}}{13 \text{ water.}}$$

Hence 11 parts by weight of alcohol of sp. gr. 0.835 at 60° F. require 13 parts by weight of water to make an alcohol having a sp. gr. of 0.941 at 60° F.

The foregoing scheme is herewith presented with annexed table as the best I can suggest, and I would recommend the adoption of the table. It will be found useful not only for the purpose for which it is designed, but will, sufficient scope having

been given to the table, be of use in reducing alcohols regained by apothecaries in the manufacture of fluid extracts.

All that is required is to take the sp. gr. of the alcohol at a temperature of 60° F., and should be done any way when the package is received. The table furnishes in addition the percentage strength of alcohol at 77° F. as proposed by Dr. Squibb, as it is frequently desirable and much easier to raise the temperature than to lower it. The proportions given in the table are approximately correct, most of them having been verified by actual experiment and found to correspond with the calculations.

I have not determined the rate of contraction which takes place in making these mixtures, as contraction does not enter as a factor when alcohol and water are mixed and used as parts by weight.

Sp. gr. at 60° F.	Sp. gr. at 77° F.	Amounts by weight of alcohol and water, as per calculation.	Simple ratios by weight of alcohol and water.
0.817	0.809	{ Alcohol, 110,295 Water, 150,000	{ Alcohol, 11 Water, 15
0.819	0.811	{ Alcohol, 75,000 Water, 100,000	{ Alcohol, 3 Water, 4
0.822	0.814	{ Alcohol, 38,900 Water, 51,000	{ Alcohol, 39 Water, 51
0.825	0.817	{ Alcohol, 39,000 Water, 50,000	{ Alcohol, 39 Water, 50
0.827	0.819	{ Alcohol, 19,920 Water, 25,000	{ Alcohol, 4 Water, 5
0.830	0.822	{ Alcohol, 12,999 Water, 16,000	{ Alcohol, 13 Water, 16
0.833	0.824	{ Alcohol, 99,578 Water, 120,000	{ Alcohol, 5 Water, 6
0.835	0.827	{ Alcohol, 110,215 Water, 130,000	{ Alcohol, 11 Water, 13
0.838	0.830	{ Alcohol, 13,030 Water, 15,000	{ Alcohol, 13 Water, 15
0.840	0.832	{ Alcohol, 150,681 Water, 170,000	{ Alcohol, 15 Water, 17
0.843	0.835	{ Alcohol, 90,694 Water, 100,000	{ Alcohol, 9 Water, 10
0.846	0.838	{ Alcohol, 12,070 Water, 13,000	{ Alcohol, 12 Water, 13
0.848	0.840	{ Alcohol, 17,038 Water, 18,000	{ Alcohol, 17 Water, 18
0.851	0.843	{ Alcohol, 390,012 Water, 400,000	{ Alcohol, 39 Water, 40
0.853	0.845	{ Alcohol, 10,000 Water, 10,000	{ Alcohol, 1 Water, 1

ON THE INCREASE OF VOLUME BY DISSOLVING
SOLIDS IN LIQUIDS.*

BY P. C. CANDIDUS.

QUERY 13 —On dissolving solids in water or other liquids, a change of bulk is generally produced, consisting in nearly every case of an increase of volume. It is desired to work out a table of the changes of bulk produced by dissolving definite quantities of officinal solids in definite quantities of menstrea.

In answering Query No. 13, I would state that the menstruum used was in all cases measured at 15.55° C. (= 60° Fahrenheit), and that after solution measure was again taken at the same temperature.

NAME OF SOLID.	Quantity.	Menstruum at 15.55 C. or 60 F.	Quantity used.	Increase.	
	Grams.		cc.	cc.	cm.
Acidum citricum.....	20	Aqua.	20	13	
“ benzoicum.....	10	Alcohol (818).	40	8	
“ gallicum.....	10	Alcohol (818).	50	5	4
“ tannicum.....	20	Aqua.	40	11	2
“ tartaricum.....	30	“	30	13	2
“ oxalicum.....	5	“	40	4	
Alumen.....	3	“	45	1	4
Aluminii sulphas.....	10	“	20	4	4
Ammonii chloridum.....	10	“	30	7	
Ammonii carbonas.....	10	“	40	5	
Ammonii bromidum.....	15	“	23	7	2
Antimonii et pot. tart.....	3	“	45	0	4
Argenti nitras.....	10	“	10	2	
Barii chloridum.....	5	“	20	1	2
Chloral.....	15	“	8	8	8
Calci hypophosphis.....	5	“	30	1	
Cinchonae sulphas.....	3	Alcohol (818).	40	2	
Camphora.....	5	Alcohol (818).	30	5	2
Cupri sulphas.....	10	Aqua.	40	3	4
Cuprum ammoniatum.....	5	“	10	2	
Ferri citras.....	5	“	40	3	
Ferri sulphas.....	10	“	20	4	2
Magnesii sulphas.....	15	“	45	8	
Manganesii sulphas.....	5	“	12	0	8
Morphiae sulphas.....	1	“	10	0	2
Hydrargyri chlorid. cor....	3	“	45	0	0
Plumbi acetas.....	10	“	20	4	
Plumbi nitras.....	5	“	40	0	4
Potassii acetas.....	10	“	10	6	
“ bicarbonas.....	5	“	25	2	
“ bichromas.....	5	“	50	1	6
“ bromidum.....	10	“	30	3	2
“ carbonas.....	10	“	10	4	8
“ chloras.....	3	“	50	1	
“ ferrocyanidum.....	10	“	40	4	
“ iodidum.....	10	“	10	3	
“ nitras.....	4	“	20	2	
“ et sodii tartras.....	5	“	15	0	8
“ sulphas, pulv.....	3	“	40	0	4
“ sulphuretum.....	5	“	20	2	
Quiniae sulphas.....	3	{ Acid, sulph. dil. }	{ 2 }	2	2
Saccharum alb. (crushed)..	10	{ Aqua. }	{ 6 }		
Sodii boras.....	2	Aqua.	30	6	
“ bicarbonas pulv.....	2	“	30	0	4
“ carbonas.....	10	“	30	5	
“ chloridum.....	10	“	30	3	5
“ hypophosphis.....	5	“	20	2	6
“ sulphas.....	5	“	20	3	
“ phosphas.....	5	“	40	2	4
Zinci sulphas.....	10	“	20	5	0
Zinci acetas.....	5	“	20	2	0
Veratrina.....	1	Alcohol (818).	10	0	8

* Read at the Third Session.

THE PREPARATION OF DECOCTIONS AND INFUSIONS FROM FLUID EXTRACTS.*

BY WILLIAM SAUNDERS, LONDON, ONTARIO, CANADA.

QUERY 15.—Can any of the decoctions or infusions of the United States Pharmacopœia be satisfactorily prepared from the fluid extracts of the United States Pharmacopœia, and in what particulars do they differ from the infusions and decoctions prepared in the prescribed manner?

AMONG the twenty-nine infusions included in the United States Pharmacopœia there are only fourteen of which corresponding fluid extracts are officinal, while in decoctions the proportion is seven in eleven. The infusions will first be considered in their alphabetical order as they occur in the Pharmacopœia, and subsequently the decoctions in like manner. In estimating the relative value of the preparations about to be considered, the evidence of the senses of taste, smell, and sight have been relied on, as in the writer's opinion they offer the most satisfactory basis of comparison.

Infusum Buchu, U. S. P.—This infusion is of a yellowish-straw color, nearly transparent, with a faint odor and a decided taste of the leaves. When made from the fluid extract by substituting one drachm for each drachm of the leaves ordered the infusion is very milky, and the milkiness is so persistent that it is scarcely affected by repeated filtration. The color is a little deeper, and the taste much stronger than the officinal infusion, but its turbidity makes it so unsightly that it is quite unfit for the purpose designed.

Infusum Calumbæ, U. S. P.—Is of a yellowish-straw color, nearly transparent, with a decided taste of the root. Prepared from the fluid extract the color is a little deeper, nearly transparent, and possesses the taste of the root in a much greater degree. When diluted with an equal bulk of water it is then fully as strong as the officinal infusion. If there is no objection to the increased strength of the preparation, the use of the fluid extract here would be a decided improvement.

Infusum Cinchonæ Flava, U. S. P.—This preparation is of a pale straw-color, transparent, with a decidedly bitter taste and fair

* Read at the Fourth Session.

flavor of yellow bark. From fluid extract, when mixed with water, the liquid becomes quite turbid, which turbidity is not perceptibly affected by the addition of the prescribed quantity of acid, and a bulky precipitate soon subsides. When filtered the liquid is transparent, and a little deeper in color than the officinal infusion; it is also somewhat more astringent, but in degree of bitterness no difference could be detected. The extract might be advantageously used here.

Infusum Digitalis, U. S. P.—Color deep yellowish-brown, transparent, with all the sensible properties of the ingredients well brought out. Prepared from fluid extract it is transparent, but slightly opalescent, paler in color than the officinal infusion, but identical in taste and odor. The fluid extract may be satisfactorily used in this instance.

Infusum Krameriz, U. S. P.—This is of a rather light port wine color, astringent and transparent. Made from the fluid extract it is at first muddy, but when filtered it is identical in color and astringency with the officinal infusion. The use of the extract would be satisfactory in this case also.

Infusum Pareiræ, U. S. P.—This infusion is of a pale sherry color, with a strong taste of the drug. From fluid extract the result is first a turbid mixture, which, when filtered, is opalescent; the color is slightly darker than the infusion of the Pharmacopœia, and the taste decidedly stronger. The fluid extract may be used to good purpose here.

Infusum Pruni Virg, U. S. P.—Color of deep sherry, with a moderately strong taste of the bark, slightly astringent. When prepared from the fluid extract the liquid becomes milky, but after filtration is transparent; the color is much lighter than the officinal infusion, and the flavor decidedly less. As thus prepared the infusion is quite inferior, hence the fluid extract could not be satisfactorily used in this instance.

Infusum Rhei, U. S. P.—Nearly transparent, of a deep yellowish-brown color, with a rather faint taste of the root. From fluid extract, when the extract is added to the water, the mixture becomes very turbid, and filtering scarcely improves it. The color is about the same as the officinal infusion, but the taste is much stronger; the persistent opacity of the infusion thus made would be a bar to the use of the fluid extract here.

Infusum Sennæ, U. S. P.—This infusion is of a deep port wine

color, with a decided odor and strong taste of the leaves. Made from the fluid extract it is similar in color, with a stronger odor and decidedly stronger taste. The presence of the coriander in the officinal infusion scarcely makes any perceptible difference; the extract is well adapted for the preparation of this infusion.

Infusum Serpentariæ, U. S. P.—This preparation is of a straw color, almost odorless, with a moderately strong taste of the root. From the fluid extract a milky mixture is produced, which is scarcely altered by filtration; color pale-yellowish, with a strong odor and very strong taste of the root. The infusion prepared in this manner, although it represents the drug satisfactorily, would be objectionable on account of its persistent milkiness.

Infusum Spigeliæ, U. S. P.—This is of a dark straw-color, transparent, almost odorless, and with a slight taste of the root. Prepared from the fluid extract it is of a paler straw-color, transparent, with a stronger odor and a decidedly stronger taste of the root; the fluid extract may be used with advantage here.

Infusum Taraxaci, U. S. P.—Is of a deep sherry-color, slightly opaque, with a faint taste of the root. Made from the fluid extract it is deeper in color, with a much stronger taste; diluted one-half it is still fully as deep in color and as strong to the taste as the officinal infusion; the use of the extract in this case is very satisfactory.

Infusum Valerianæ, U. S. P.—Almost transparent, of a pale sherry-color, with a faint odor and very slight taste of the root. When prepared from the fluid extract the liquid is quite milky, and filtering scarcely improves it. It has a strong odor and taste of the drug, but the preparation is objectionable on account of its milkiness.

Infusum Zingiberis, U. S. P.—This infusion is of a very pale straw-color, with a slight odor and moderately strong taste of the drug. Made from the fluid extract it is pale in color and very milky, but slightly improved by filtration; it has a strong odor of ginger, and a very much stronger taste than the officinal infusion,—fully double the strength,—but in consequence of the persistent milkiness of the mixture the use of the officinal fluid extract is not to be recommended.

DECOCTIONS.

Decoctum Chimaphilæ, U. S. P.—This decoction is of a deep yellowish color, slightly opalescent, nearly odorless, with a strong

taste of the leaves. Prepared from the fluid extract it is at first very turbid, and after a short time a bulky precipitate subsides. When filtered it is quite transparent, and slightly paler in color than the officinal decoction. In odor and taste they are undistinguishable. The fluid extract may be used satisfactorily in the preparation of this decoction.

Decoctum Cinchonæ Flava, U. S. P.—This is a very turbid decoction which filtration scarcely affects, of a pinkish color, with a decided taste of the bark; a very unsightly preparation. When prepared from the fluid extract the result is a very muddy mixture, which, on standing, deposits a bulky precipitate. When filtered it becomes a clear liquid of a pale color, with a very much stronger taste of the bark than the officinal decoction. The decoction prepared from the extract is much preferable in this case.

Decoctum Cornus Floridæ, U. S. P.—Color pale reddish-brown, somewhat opalescent, with a slightly astringent and bitter taste. From the fluid extract is obtained a decidedly darker liquid, more transparent when filtered, and with a very much stronger taste of the bark. The decoction made from the fluid extract is very satisfactory here.

Decoctum Dulcamaræ, U. S. P.—Color yellowish-brown, nearly odorless, slightly turbid, transparent when filtered, with a slight taste of the drug. Prepared from the fluid extract the color is about the same, transparent, with a decided odor and strong taste of the twigs. The decoction from the fluid extract is a much better preparation than the officinal decoction.

Decoctum Sarsæ co., U. S. P.—This is a muddy liquid of a dark-brown color, which filters very slowly, and is scarcely affected by filtration; it has a faint taste of the ingredients, and is altogether an unsightly and unsatisfactory preparation. When made from the fluid extract (which differs in containing no guaiacum wood) it is a dark, reddish-brown, transparent liquid, becoming a little brighter when filtered, with a very much stronger taste of the ingredients than there is in the officinal decoction. The use of the fluid extract is much to be preferred in this instance.

Decoctum Senegæ, U. S. P.—Color brownish-yellow, slightly milky; odor and taste of senega very strong. When made from the fluid extract the liquid is paler in color, transparent, with the odor and taste fully one-third stronger than in the officinal

decoction. If the additional strength is not objectionable the use of the extract would be satisfactory here.

Decoctum Uvæ Ursi, U. S. P.—This decoction is of a pale-brown color, turbid, but slightly improved by filtration; odor and taste of the drug strong. From the fluid extract a turbid liquid results, which, when filtered, is almost transparent, with the odor of the leaves stronger and the taste fully as strong as in the official decoction. In this instance also the extract may be used to advantage.

The infusions in the foregoing series may be divided into two classes: those which are prepared with boiling water, and those made without heat by percolation. There are nine of the former and five of the latter. The latter, the results of cold percolation, yield infusions, in several instances, of so good a quality as to leave little room for improvement, while most of those made with boiling water but poorly represent the qualities of the drugs from which they are made. The fluid extracts, also, will admit of a similar division into those prepared with strong and diluted alcohol. In almost every instance where the fluid extract is made with diluted alcohol, the corresponding infusion can be satisfactorily prepared from the extract, and will usually give after filtration a better result than when made after the official formulas. Where fluid extracts are prepared with strong alcohol, such as buchu, serpentaria, and valerian, and the infusions from them are so turbid as to be unsightly, this difficulty can be overcome by modifying the alcoholic strength of the menstruum used in making them.

A fluid extract of buchu was prepared with a menstruum composed of two parts of alcohol to one of water, which entirely exhausted the drug, and an infusion made from it was much less milky, in fact, semi-transparent, so that its use would not be objectionable for this purpose. The infusion in this instance possessed the odor and taste of the leaves in a stronger degree than that made from the official fluid extract.

An extract of serpentaria was made with diluted alcohol, with entire exhaustion of the root, and an infusion prepared from it which was quite transparent, with an odor and taste almost as strong as that made from the official extract, and which represented the properties of the root much better than the official infusion.

In like manner an extract of valerian prepared with dilute alcohol exhausted the root, and furnished an infusion which was quite transparent, of a deep brownish sherry-color, with an odor and taste nearly if not quite as strong as that made from the extract of the U. S. P.

In the case of the fluid extract of rhubarb, also, by reducing the alcoholic strength of the menstruum from two to one to that of equal measures of alcohol and water, the milkiness of the infusion made from it was so far obviated as to be scarcely an objection to its use.

In the preparation of decoctions better results were obtained in each instance by the use of the fluid extracts and subsequent filtration.

ON THE GALENICAL PREPARATIONS OF THE PHARMACOPŒIA.

AND A NEW FORM OF MEDICATION TERMED SACCHARATED EXTRACTS.*

BY C. S. N. HALLBERG.

THE galenical preparations of the Pharmacopœia are and always have been the source of a vast amount of literature contributed to the pharmaceutical journals from one year to another.

The manner of preparation of the tinctures and fluid extracts in particular seems never to have attained that degree of perfection which is so much desired by the more pretentious pharmacist. From the time he enters the calling as a tyro till, in after years, when he considers himself practically an expert manipulator, not only their preparation but also their remaining in a subsequent satisfactory condition is a source of great annoyance. He looks to the Pharmacopœia as a guide and authority on the subject, and undoubtedly derives substantial benefit from the same, but that it is not what it might be is also generally conceded. The numerous essays and other publications on the points to be observed in producing preparations that are *quantitative* and *permanent* solutions of the active principles of the drug, though frequently superfluous, are yet expressive of the state of affairs.

The greater number of the *tinctures* made after the formula of

* Read at the Fifth Session.

the present Pharmacopœia will, even in the hands of a skilful manipulator, not be satisfactory. As a rule, there is a cry for an increase in the alcoholic strength of the menstrua, on the ground that it would prevent precipitation, and render the preparation more stable in many instances. The objections to this would appear to be, 1st, that unless the percentage of drug was correspondingly increased, and this might be inconsistent, the administration of alcohol in *larger* doses would be unavoidable; 2d, the active principles of the milder remedies would not be so readily soluble in any stronger alcoholic menstrua, and hence therapeutic value be sacrificed for permanency and elegant appearance.

The *fluid extracts* are, upon the whole, more satisfactory if conscientiously prepared, but they are more difficult to manipulate, requiring much time and experience.

The precipitation which takes place in some is mostly due to: 1st, The application of heat in evaporating the last obtained percolate, after the general formula of the Pharmacopœia, which causes the alcohol to volatilize, and leaves an aqueous solution to be added to the alcoholic liquid previously obtained; glycerin, if present, hindering this precipitation only temporarily.

2d. To mechanical causes, such as change in menstrua at too early a stage in the process of percolation, or sufficient regard not being paid to other essential points.

The repercolation process is the most satisfactory and entirely practicable, but is at first sight somewhat complicated, and the strictest care and attention are essential for producing preparations representing the strength and activity of the drug.

It has this disadvantage for the pharmacist: there are not more than half a dozen fluid extracts that the average pharmacist uses in such quantities as to warrant his bestowing so much time and care as are necessary in the process of repercolation, and this practically excludes the latter for general application.

The *solid extracts* would receive more attention were it not for their instability and their ineligible consistency, as well as their great difference in strength and sometimes worthlessness. An extract should be the soluble matter of the drug concentrated to a suitable consistency, the menstruum such as would exhaust the drug of its active principles to the exclusion of inert matter.

The variation in alcoholic strength of the menstruum would govern to a great extent the percentage of yield of extract of a

good many drugs. As the dose of an extract is governed by the relation of the latter to the drug, the former would vary correspondingly to menstruum used in the preparation of the extract. Extracts are, as a class, not made by the pharmacist for reasons that are obvious. Suppose that some manufacturers, aware that the greater the yield of extract the more remunerative the operation, do not always restrict themselves to the use of menstrua of officinal strength, and consequently obtain extracts weaker than those of the Pharmacopœia, the dose of which is based upon extracts obtained by the employment of menstrua of officinal strength.

The impediment which the solid extracts are to the otherwise rapidly progressing elegant pharmacy is generally conceded. The space which they occupy in the dispensing counter, as well as anything connected with their preservation or dispensing, is, to say the least, disagreeable and tedious.

Glycerin enters largely in some manufacturers' extracts, serves to keep them soft, but becoming too much so in hot weather, and certainly reduces their strength.

Of late the powdered extracts have been used, but they are not reliable on account of the indefinite amount of something varying from five to twenty-five per cent., which has to be added to replace moisture, or to bring the strength of the powdered extract up to that of the ordinary, and to render the preparation permanent as powder. The fallacy of the latter experience has amply proved.

If the plan of the German Pharmacopœia had been adopted, incorporating an equal weight of an inert substance with the extract, rendering the preparation half the strength of the extract, the powdered extracts would have been more satisfactory and sufficiently concentrated, but still sharing the objections in regard to strength of the ordinary extracts.

The extracts above referred to are those made with alcohol of different strengths; with a few *important* exceptions, the aqueous extracts, especially the inspissated juices of the narcotic plants, are unstable and unreliable.

The officinal extracts prepared by exhausting the drug first with alcohol and then with water, evaporating the respective solutions and mixing the extracts, should be dispensed with in their present form. There are two of this class. In the preparation

of extract of cinchona the evaporation of the aqueous percolate is entirely superfluous, as it does not yield any residue.

The large percentage of extractive matter obtained from the aqueous percolate in the preparation of extract of jalap is considered inert.

The treatment with water in the preparation of these extracts is only useful in displacing the alcohol contained in the residue. To sum up, objections have been set forth to most of the different classes of preparations of the vegetable remedies.

1. *To the tinctures*, on account of their unstableness and dilute strength, necessitating the administration of large doses of alcohol to receive even a moderate dose of the drug. The *rationality* of this is questionable, when, in the administration of some remedies, their effect is neutralized, or a change quite the reverse of that anticipated is experienced.

2. *To the fluid extracts*, on account of their not being permanent and normal solutions of the active principles of the crude drug, unless their preparation is most carefully conducted, requiring much time and attention.

3. *To the solid and powdered extracts*, in view of their great variation in strength and *unstable* and ineligible form.

The extract is the true medicine, representing *all* the active principles to which the properties of the drug are due, and therefore frequently preferred to the alkaloids, providing the percentage amount of the latter is at least approximately known.

Modern pharmacy, recognizing the impracticability of the general use of the ordinary extracts, devised the fluid extracts and adopted the only true standard of strength, that of the *drug*.

The theory is held, that the unavoidable variation in the crude drug is small compared to the variation in the strength of the ordinary extracts. In view of this theory, would it not be proper to discard the extracts from the Pharmacopœia unless the drug itself is adopted as a standard of relative strength.

Preparations representing the properties of the drug in the form of its extract, reduced to the strength of the drug, not open to any of the objections previously enumerated, have been termed *saccharated extracts*.

The dry extractive matter of the drug is triturated with sufficient *milk-sugar* to render it the same weight as that of the drug employed.

During the operation the yield of extract is noted and indicated on the label, which will not vary a great deal if the crude material is properly cured and thoroughly exhausted, appropriate menstruum being invariably used. In the more powerful remedies, such as owe their activity to alkaloids, an assay is carefully made, which, in view of the many improvements in processes for the estimation of most of the alkaloids, can be readily undertaken and satisfactorily performed in a comparatively short time. So can belladonna leaves be assayed for atropia in a *few hours* by Mayer's solution.

The advantages of these extracts over any other form of preparation will be seen at once. They would replace all the dilute preparations on account of their small bulk, elegance, and convenience for the dispenser as well as consumer.

Over the *fluid extracts* the saccharated possess decided advantages, the preparation of the latter *allowing the complete exhaustion of the drug with any menstruum most appropriate, without any regard to its subsequent stability.*

In the preparation of the fluid extracts the proper menstruum has sometimes to be discarded, inasmuch as its employment would yield an unstable and unsightly product; a sacrifice similar to that occurring in the elegant elixirs.

In the *saccharated extracts* the bitter taste of bitter and resinous medicines is very much modified, and they are miscible with any liquid, the objections to the alcoholic fluid extracts being in this wise overcome.

Over the *ordinary and powdered extracts* the merits of the saccharated are *most conspicuous.*

Stable at all times, with the most ordinary precautions, the latter are always in a permanent and convenient pulverulent form, expediting their dispensing, and insuring their rapid and accurate division, thereby economizing time and insuring a homogeneous mixture with almost any other substance.

Over the *powdered extracts* they have the advantage of being soluble and definite as to strength, as well as retaining the form of *powder.*

The only objection which would, in *some* instances, pertain to the employment of the saccharated extracts in place of the ordinary ones, is their greater bulk. This would be overcome by making the extracts of the more powerful remedies double or quadruple the strength of the drug, care being taken to have these

properly designated. This would dispense with the only objection, as it would render these extracts sufficiently concentrated for all practical purposes, their permanency not being interfered with.

Dry medication seems to be on the increase of favor with prescriber as well as consumer. The saccharated extracts would be the most convenient form for the physician to devise any style of medicine which would be desired by his patient; for the pharmacist to readily manipulate into any of the various novelties, as they are demanded, not leaving him at the mercy of the manufacturers of all the different "bon-bons" as they become alternately fashionable or obsolete from time to time.

In the preparation of Dover's powder and compound powder of licorice, and various extemporaneous mixtures, the *saccharated* extracts, or *soluble drugs* as they might be termed, could be substituted for the crude drug. They are also applicable to the filling of capsules, wafers, cachets de pain, compressed pills, troches, and suppositories. With a little instrument, termed the combination mould, they can be rapidly made into any of these various forms.

The next question to consider is, what advantage milk sugar has over alcohol as a preservative and vehicle. So much conflict of opinion exists in regard to the administration of the last mentioned that its discussion will be refrained from, but this much must be conceded, that it is best to remain on the side of exclusiveness.

Where alcohol precipitates the pepsin and albuminous matter in the gastric juice, milk-sugar facilitates assimilation, and does *not ferment* in the stomach.

The question whether the process for preparing these saccharated extracts is sufficiently practicable for general application must not be left unnoticed. Experience with about fifty of the most ordinary remedies, has proven it entirely practicable.

Drugs owing their value to volatile principles (ethereal oils) can be exhausted with alcohol, and evaporated at a low temperature still contain the active principles. They are more safely made by exhausting first with ether, and then with alcohol. One exception encountered is ergot. The *extractum secalis cornuti* of the German Pharmacopœia, or Bonjean's ergotin, was prepared, but on account of its great hygroscopic properties its

subsequent trituration with milk-sugar was impracticable. If the ergot had previously been deprived of its fixed oil, a more satisfactory conclusion might have been arrived at.

In this connection it would not be out of place to call attention to the official recognition of extract of ergot or Bonjean's ergotin.

ON FLUID EXTRACT AND SYRUP OF SENECA.*

BY GEORGE W. KENNEDY.

QUERY 10.—Should not the fluid extract and syrup of senega be prepared with an alkaline menstruum?

In replying to this query the writer would say that he has been preparing the fluid extract and syrup of senega for the past seven or eight years with a small quantity of alkali, preferably ammonia, with very satisfactory results. The same preparations made in accordance with the officinal processes were less satisfactory. There are very few pharmacists who have not had occasion to complain of the fluid extract as now prepared, on account of its gelatinization, and this occurs more frequently during the winter or cold weather, and at a time when most of it is prescribed and consumed. Many inquiries have been made by apothecaries, from time to time, asking for an improved formula that would obviate or remedy this trouble. The writer, seeing the importance and necessity of having good stable preparations of so valuable a drug, made numerous experiments with menstrua of different alcoholic strength, and also with mixtures of glycerin, alcohol, and water, and with most of these experiments the results were decidedly unpropitious. I was better pleased with the use of the latter menstruum than with the former. It might be well to report that particular attention was paid to the selection of the drug, and also to the percolation, so that there could be no defect in this respect. I am therefore satisfied, from my close observation and experience, that the fault lies with the menstruum, as I have not noticed the slightest gelatinization, and in only a few cases a very small quantity of precipitation, during

* Read at the Third Session.

the long period of over seven years which I have been using the alkaline menstruum.

To the best of my knowledge there are no objections to the use of a small quantity of alkali in preparing either the fluid extract or the syrup, as it does not weaken or destroy the active principle of the drug (polygalic acid). Yet it is possible, in extemporaneous mixtures, chemical incompatibility may occur; but this the apothecary may guard against.

The following is the improved formula used by the writer, and from the very excellent results I have obtained from it I would recommend its use, believing, after a fair trial, that it will not be abandoned for any other.

Fluid Extract of Senega.—Senega-root in coarse powder, ℥xvi; water of ammonia (sp. gr. 0.960), ℥ij; diluted alcohol, ℥xxxij. Mix the diluted alcohol and ammoniacal water, and with this menstruum thoroughly moisten the drug; allow it to macerate twenty-four (24) hours in a covered vessel, and transfer the moistened mass to a percolator. After having packed it carefully pour on the balance of the menstruum, noticing particularly as to the rapidity of the percolation, not permitting it to drop faster than forty (40) drops per minute; reserve the first twelve fluid ounces which come through, and continue the percolation with the above alkaline menstruum until the drug is completely exhausted of its active constituent. Evaporate to three and a half fluid ounces, add half an ounce of alcohol, and mix with the reserved portion, when the extract is finished, furnishing a permanent and beautiful, transparent, dark, reddish brown-colored fluid extract, with a slight tinge of a yellowish-green.

Syrup of Senega.—In preparing the syrup I would recommend the same menstruum, conducting the process in accordance with the Pharmacopœia.

In conclusion I would mention three (3) reasons why the alkaline menstruum should be used in preference to the one now in use:

1st. It prevents gelatinization and precipitation.

2d. It furnishes much handsomer preparations, remaining clear and beautiful when carefully prepared.

3d. The last and most important: The product will be found to be decidedly more acrid and stronger, which is the best argument in favor of its use.

SPIRIT OF NITROUS ETHER.*

BY J. U. LLOYD.

As made by the officinal process, this is liable to be of different strengths ethereally, even with great care from the manipulator. It may also contain free nitric acid, and occasionally H_2SO_4 from the bursting of bubbles in the retort, thus throwing fragments of liquid upward with considerable force, often making the inside of the retort resemble spray when in sunlight. Towards the end of the process I find also a little water distils over, which tends to hasten subsequent decomposition. The specific gravity of United States Pharmacopœia nitrous ether is given at 0.837. I find the specific gravity of nitrous ether made from alcohol to which is added 5 per cent. nitrous ether to be 0.835. Four years ago I became convinced that the officinal process could be improved upon. Accordingly I have modified the formula in such a manner that the product will always be of a definite strength, while at the same time not materially altering the present process. Indeed, the formula of the present Pharmacopœia may be left unaltered up to the words, "distil two fluid ounces as before," when I would proceed to say: "Add the distillate to its bulk of solution of chloride of calcium, and cautiously agitate. Separate by means of a separating funnel the lower solution, and immediately add 5 parts of the ethereal liquid to 95 parts of alcohol."

I suggest, however, that sulphuric acid be added to the alcohol in the retort in a small stream with agitation, then add the nitric acid, then distil until the distillate equals one-third the alcohol. There is no economy in carrying the operation farther. There is no necessity for the copper practically in a manufacturing way, and I have discarded it, as I get as great a yield of ether without, and the operation progresses in every way as nicely. (The copper theory is beautiful, however, and perhaps it will not do to make too radical a change. The copper certainly does no harm.) My ordinary still is 22 gallons, stone, with 40 feet of stone coil. The charge of alcohol is 6 gallons, and the yield of ether spirits is from 40 to 90 pounds, but in a small way it may be larger, as I use ice-water to separate the ether, which will not do this effectually. The use of sulphuric acid is necessary to take water from the

* Read at the Fourth Session.

nitric acid. Change the wording of the present formula, at any rate, so that it will read that the condenser and receiver *both* must be kept cool with ice-water. I find, even with this precaution, my yield of actual 5 per cent. spirit lessens one-third in hot weather. If ordinary water is used there is no ether separated in summer.

ON THE AFFINITY OF GLYCERIN FOR WATER.*

BY G. W. KENNEDY.

QUERY 24.—The affinity of glycerin for water is well known; to what extent will officinal glycerin attract moisture on being exposed to a damp atmosphere?

WHEN accepting this query two years ago the writer fully expected to be able to report last year the results of his observations. Commencing his experiments, as soon as practicable after adjournment, he was surprised on observing the avidity of glycerin for moisture, as manifested by the continued increase in weight, which increase had not ceased at the time of the last meeting, and in some of the experiments is not completed at the present time. The rapidity with which absorption takes place must evidently be influenced by the surface exposed, and by the height of the column of glycerin; it may be expected to be greatest if a thin stratum of glycerin is placed in uninterrupted contact with the atmosphere. The dimensions of the orifice of the vessel and its total depth must, therefore, likewise have considerable influence, since upon these conditions depends, in a great measure, the more or less complete renewal of the atmosphere within the vessel. These considerations induced the writer to make use of different vessels, varying in diameter and height. A quantity of glycerin of known specific gravity was carefully weighed into each of the vessels, and these were suitably covered, so as not to obstruct free communication with the atmosphere, while at the same time contamination with dust and other impurities was prevented. The vessels were placed in a cellar, weighed from time to time, and the increase in weight carefully noted. On consulting the subjoined tables it will be observed that the ratio of absorption

* Read at the Third Session.

for each experiment was not uniform. This is accounted for partly by the changes in the weather, absorption being greater during protracted rainy or damp weather, and partly by the decreased affinity for moisture of the upper layers of glycerin, in consequence of the surface layer approaching its absorption limit. For it was noticed that the upper layer of the glycerin soon became of lighter gravity, forming a much thinner stratum, and that the moisture penetrated slowly downward, so that different strata could be observed, increasing in density from the lightest uppermost one to the lowest, which retained its syrupy consistence longest.

The results of the experiments show that glycerin should be kept in well-stoppered bottles, and that the same precaution is necessary with all medicinal preparations containing a large proportion (over 60 per cent.) of glycerin, all of which would on exposure absorb moisture, and in consequence thereof decrease in strength.

DETAILS OF EXPERIMENTS (COMMENCED NOVEMBER 2D, 1877).

Vessel.	Flat jar.		Quinine bottle.		Vial.	
	1.	2.	3.	4.	5.	6.
Width at mouth.....	2¾ in.	2¾ in.	1⅞ in.	1⅞ in.	1⅞ in.	1⅞ in.
Diameter of body.....	2¾ in.	2¾ in.	1⅞ in.	1⅞ in.	2 in.	2 in.
Height.....	2¼ in.	2¼ in.	4½ in.	4½ in.	5⅞ in.	5⅞ in.
Depth of glycerin....	1¼ in.	1¼ in.	1¾ in.	1¾ in.	2⅞ in.	2⅞ in.
Weight of glycerin...	1200 grs.	1200 grs.	1200 grs.	1200 grs.	1200 grs.	1200 grs.
Spec. grav. glycerin..	1.26	1.23	1.26	1.23	1.26	1.23

	1.		2.		3.		4.		5.		6.	
Weight of vessel and glycerin at beginning of experiment.	11¼ oz. + 52 gr.	Gain.	12¼ oz. + 60 gr.	Gain.	6 oz. + 64 gr.	Gain.	6¾ oz. + 26 gr.	Gain.	7 oz. + 21 gr.	Gain.	6¾ oz. + 21 gr.	Gain.
1877.												
Nov. 9th.	+135	83	+140	80	+79	15	+40	14	+31	10	+30	9
Dec. 17th.	275	140	278	138	123	44	83	43	45	14	43½	13½
1878.												
Feb. 2d.	406	131	408	130	167½	44½	127	44	59½	14½	56½	13
April 22d.	511	105	512½	104½	235	67½	194	67	83½	24	79½	23
May 31st.	602	91	603	90½	270	35	228½	34½	101	17½	96	16½
June 13th.	635¾	33¾	633¼	30½								
July 13th.	695¾	60	689¼	56	318	48	276½	48	124½	23½	118	22
Aug. 10th.	720	24¼	714	24¾	364½	46½	322½	46	142½	18	135½	17½
Sept. 4th.	745½	25½	739	25	406	41½	364	41½	156½	14	149½	14
Oct. 3d.	756½	11	750	11								
Oct. 9th.					444	38	401½	37½	173½	17	166	16½
Oct. 15th.	761	4½	754	4								
Nov. 1st.	764	3	755½	1½								
Nov. 4th.					457	13	414½	13	181½	8	174	8
Nov. 15th.	765	1	756	½								
Dec. 8th.					476½	19½	433½	19	194	12½	186	12
1879.												
Feb. 10th.					493½	17	450½	17	204	10	196	10
March 10th.					505	11½	461	10½	212	8	204	8
April 13th.					516	11	471	10	218½	6½	210	6
May 5th.					525	9	480	9	224½	6	216	6
June 4th.					545½	20½	500	20	237	13	229	13
July 8th.					566½	21	521	21	251	14	243	14
Aug. 6th.					591½	25	545½	24½	266¼	15¼	258	15
Sept. 4th.					614	22½	568	22½	276½	10¼	268	10
Total am't of moisture absorbed.		713		696		550		542		255½		247
Or per cent.	59.417		58.		45.835		45.167		21.292		20.583	

SECOND REPORT ON FLUID EXTRACTS.*

BY C. LEWIS DIEHL.

SINCE the date of my first report on fluid extracts, made to the Association at Atlanta, I have not been notified of further co-operation with me in this work. This is the more to be regretted because I have myself been able to make a few experiments only, and had hoped that sufficient material would be furnished to secure the construction of formulas for fluid extracts. Nevertheless, I do not present this empty-handed, since the few experiments made during the year have confirmed some points regarding which reasonable doubts had existed in my mind. Leaving, therefore, the selection of the menstrua and the construction of formulas to the future, I shall confine myself in this report to the consideration of the following questions:

1. Does "fractional percolation" present any advantages over "simple percolation?"

2. Is it advisable to employ heat in the preparation of fluid extracts?

3. Can the formulas for fluid extracts be so constructed that all measurements shall be by weight?

4. Should the present strength of fluid extracts be retained?

Before considering these questions, however, I would remark, by way of explanation, that throughout my experiments the fact has been prominently before my mind that the processes of the Pharmacopœia are constructed for pharmacists and not for manufacturers, and that a process that may work well when the pharmacopœial quantities are used, may be unsuited to a more extended production of the same, while, reciprocally, a process adapted to the purposes of the manufacturer, though furnishing a faultless preparation in his hands, is not necessarily a good process for pharmacopœial quantities. I would also observe that in my replies I have endeavored to confine myself tersely to the subject, and that, whenever necessary, I have simply referred to points in my previous report instead of enlarging this by quotations. Also, that the conclusions arrived at are distinctly those derived from observations and experiments.

* Read at the Fourth Session.

FIG. 65.
I

4	8
3	7
2	6
1	5
A	B

8
7
6
5
4
3
2
1
B
A

II.

A and B are extracted respectively by only 4 cubic inches of

1. Does “fractional percolation” present any advantages over “simple percolation?”

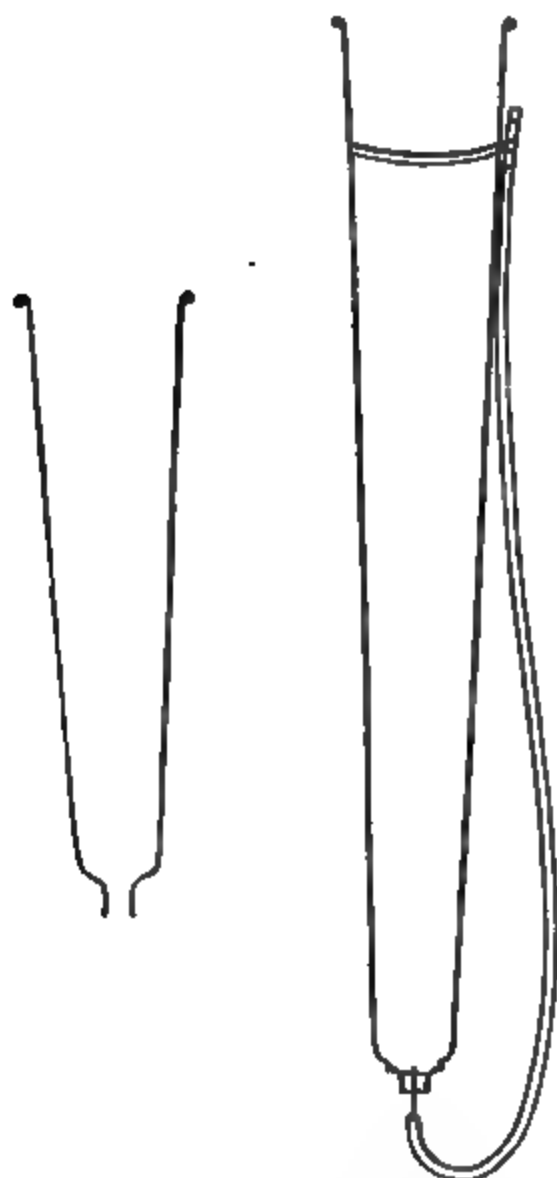
A superficial examination of the tables in my first report, and particularly Table 4, might naturally lead to the view that “fractional percolation” has decided advantages over “simple percolation,” inasmuch as, with a single exception, the quantity of extracted matter in the reserved portion is larger in the instances of the first than in the last named process. And it is really so if we accept the conditions under which the experiments were made, and if we do not take into account the increased trouble and time involved by “fractional percolation.” But if we alter the conditions the result stands very differently. “Fractional percolation” depends upon the idea to extract repeated quantities of a drug with the same menstruum. Under the present conditions we divide the drug into two equal portions. and after exhausting the first portion use the percolate, after having set aside a certain quantity, to exhaust the second portion. If we prepare both portions for percolation in separate percolators of the same size and shape, place one above the other, and allow the percolate from the upper to fall direct upon the contents of the lower, we can, with proper precautions, accomplish fractional percolation with just as good results as in the first case. And if this is true why can we not accomplish the same object by “simple percolation” if we increase the height of the column without increasing its diameter? Theoretically, far better results should be obtained, as will become evident on comparing Fig. 65, I and II. In I we have a column, say 5 inches high, with a capacity of 10 cubic inches; in II we have a column of the same capacity, but the height is 10 inches. A and B each represent a cubic inch of drug; 1, 2, 3, 4, 5, 6, 7, 8, each represent a cubic inch of menstruum. Now if we imagine a line drawn through the centre of the column, I, it becomes apparent that

menstruum, while in the column II, *B* and *A* are successively extracted by the entire quantity, or 8 cubic inches of menstruum. Being well aware, however, of the difficulties attending the percolation of high columns of vegetable powders, and particularly of narrow columns of such, I had some glass percolators constructed which, while of the same diameter at the upper and lower end as those ordinarily constructed, should be just twice the usual height. Those received are illustrated by Fig. 67, along-

FIG. 66.

FIG. 67.

FIG. 68.



side of which, represented by Fig. 66, is placed one of ordinary construction to illustrate the difference in height, which proved not to be quite double. Ergot was selected for the experiment. Two of the extra long percolators, as nearly as possible of the same size, were provided with what may be called Squibb's tubes, as seen in Fig. 68. Into one 16 troy ounces of ergot, in powder

No. 40, were packed as directed in the "scheme," and was found to occupy a height of 10.5 inches; in the other 8 troy ounces were found to reach to the height of 5.5 inches, the difference in relative height being accounted for by the greater narrowness of the lower part of the percolators. From the first percolator fractions, each of 4 fluid ounces of percolate, and corresponding to those obtained as final by fractional percolation, were obtained; the 8 troy ounces in the second percolator were treated as for fractional percolation, and the proper fractions were then used for a second portion of 8 troy ounces, packed and treated in the same way. The result is shown in the following:

2 cc. of each fraction contained:

Simple Percolation.					Fractional Percolation.				
1,	.	.	.	0.478 gram	1,	.	.	.	0.364 gram
2,	.	.	.	0.844 "	2,	.	.	.	0.481 "
3,	.	.	.	0.182 "	3,	.	.	.	0.226 "
4,	.	.	.	0.096 "	4,	.	.	.	0.087 "
5,	.	.	.	0.058 "	5,	.	.	.	0.043 "
6,	.	.	.	0.035 "	6,	.	.	.	0.026 "
7,	.	.	.	0.017 "	7,	.	.	.	0.014 "
Total, . . . 1.210 "					Total, . . . 1.241 "				
Of which . . . 1.004 "					and . . . 1.071 "				

respectively were contained in the reserved portions.

The experiment shows that nearly as good results can be obtained by simple as by fractional percolation. That the latter under the same conditions shows somewhat better results must be attributed to the fact, that while in the case of simple percolation the entire quantity of drug is moistened with the original menstruum, in the case of fractional percolation one-half of the drug is moistened with partly saturated percolate. But the difference is not sufficient, either under the conditions mentioned, or even under those of the "scheme," to justify the adoption of fractional percolation, if we consider the extra trouble and time involved, and I would therefore, of the two, recommend simple percolation, selecting for that purpose tall, slender, moderately tapering percolators.

2. *Is it advisable to employ heat in the preparation of fluid extracts?*

In my first report I have already expressed some decided views on this subject. I have since then had no occasion to change

these views, but, to the contrary, have been confirmed in my opinions by additional observations. It is true that it is extremely difficult to precisely estimate the eventual injury that heat may exert upon complex vegetable solutions. Analysis even need not necessarily lead to a reliable conclusion on this point, and the only evidence that remains is the general character of the preparation. I have also already directed attention to the importance of using the same menstruum throughout in the preparation of fluid extracts, and that the evaporated portion should be restored to its original alcoholic strength. In every case that has come under my observation I have found that if this is done the evaporated portion, however turbid it may be at the time, and however thick the precipitate, will form a clear solution as soon as the necessary quantity of alcohol has been added, and the amount of insoluble matter settling subsequently in the fluid extract is in most cases quite insignificant. The time during which this portion of percolate is exposed to heat, which may be quite moderate, is very short, and cannot very materially change the character of the substances contained in it if we may be allowed to judge by its ready resolution in the original menstruum. Very little additional trouble is involved by the restoration of the original menstruum. After setting aside the portion to be reserved the subsequent percolates, necessary to practical exhaustion, are collected,—preferably in fractions if the substance is easily changed by heat,—and, the amount of extracted matter being determined in each fraction, they are evaporated in succession until the quantity of water, represented by the total weight minus the previously ascertained weight of extracted matter, is a little short of the quantity required to dilute a proper quantity of alcohol to the original strength. The evaporated portion, so restored by the addition of alcohol, is added to the reserved portion, and the capsule may then be washed with the remaining menstruum necessary to bring the fluid extract to the proper measure. In reference to the question I unhesitatingly reply that the moderate heat required in the preparation of fluid extracts on the scale of the Pharmacopœia does not materially injure them.

3. *Can the formulas for fluid extracts be constructed so that all measurements shall be by weight?*

It is well known that different samples of the same drug vary in their strength, and often quite materially. It may therefore

be argued that if we can approximately arrive at the weight of a given volume of a fluid extract obtained by a given process, we can formulate the latter so as to dispense with measurement by volume altogether. I hold, however, that this would be venturing upon very dangerous ground. We must make a beginning somewhere; and the beginning in all cases, except perhaps opium and a few other highly active drugs, should be the drug itself,—the conditions of which admit of explicit description. Now if it is claimed that by a change in the notation of the officinal formulas to parts by weight the prescribers will at once, or at all events after a reasonably short time, accommodate themselves to the new system of notation, a perfectly plain course would be before us; we would make the fluid extracts correspond in weight to that of the drug from which they are prepared. But it will not be contended that so complete a revolution in the present mode of prescribing is expected, if, indeed, it is intended. To the contrary, it appears to be the object to so construct the formulas for officinal liquid preparations, that while the relation of their weight to volume remains the same as now, all measurements shall be expressed by weight. A glance at Table II in my first report will show that we cannot hope to attain accuracy if we attempt such a construction of the formulas for fluid extracts; and since accuracy is one of the main objects for discarding measurements by volume, I do not see how we can gain anything by discarding an accuracy that is attainable by care for one that is only attainable by accident, no matter how careful the manipulation may be. I would therefore say, that if we aim to secure uniformity as regards the quantity of drug to be represented by a given volume of fluid extract, we cannot discard volumetric measurement. And it is not at all necessary in the construction of formulas that we should express quantities by the metric or any other system of weights and measures, although I can see no objection to it, more particularly since an important branch of our national medical service has adopted, and directs the formulation of prescriptions by metric weights and measures. But if there exists a reasonable objection to the adoption of a particular system, the notation in the formulas of the Pharmacopœia could be expressed by the terms "*weight*" and "*volume*:" a "*volume*" being understood to be the space occupied by pure water, at a temperature of 15° C., corresponding to a "*weight*," arbitrarily

chosen as circumstances may require. The process for a fluid extract might then be formulated as follows :

Take of Drug, in powder No. x , 16 "weights."
 Alcohol,
 Water, of each a sufficiency.

Mix n "weights" of alcohol with m "weights" of water, moisten the powder with a sufficient quantity of this menstruum, and having packed it in a percolator suitably prepared, pour on menstruum until the entire column of powder is penetrated and an excess remains upon the surface. Carefully cover the percolator, set aside in a moderately warm place, and after two, three, or four days proceed to percolate. Collect the first twelve "volumes" that pass separately in a bottle graduated to sixteen "volumes," and set this aside carefully stoppered; continue the percolation until the drug is exhausted. Ascertain the quantity of extracted matter in this second percolate by the evaporation of a suitable fraction of the same to dryness, and then subject the whole to distillation and subsequent evaporation on a water-bath until its weight is so far reduced that by the addition of alcohol the strength of the original menstruum may be restored, and it shall measure four "volumes." Finally add these four "volumes" of liquid to the twelve "volumes" of reserved percolate, mix, and filter if necessary.

4. *Should the present strength of fluid extracts be retained?*

I do not propose to say very much on this point. I feel constrained, however, to say this, that in the majority of instances fluid extracts are more concentrated than is necessary to successful medication. Furthermore, it is my belief, unsupported, however, be it understood, by direct experiments, that fluid extracts are in many instances too concentrated to hold in solution all that the menstruum is capable of extracting, and that liquid concentrations, of just half the strength of fluid extracts, would be far more permanent preparations; such preparations being in my opinion nearly saturated, might, in distinction, be designated "*saturations*," and appear to me to deserve some attention.

LOUISVILLE, September 6th, 1879.

ON THE MEDICINAL PREPARATIONS OF DRUGS.*

BY W. T. FORD, KANSAS CITY, MO.

DRUGS are often valuable on account of some special principle which is capable of isolation as an alkaloid, and may be combined with various acids to form salts, as morphia from opium, quinia from cinchona, emetina from ipecacuanha, etc., and the therapeutical value of the preparations, such as vinegars, infusions, tinctures, fluid and solid extracts, etc., depends upon the amount of the corresponding alkaloid contained therein.

Now it is at once evident that when the physician wishes to use either of these preparations it is important that he should know the exact value of the same. This evidently cannot be accomplished by using definite weights of the drug, either green or dry, because very few samples have been found to agree in this respect, and this forms one of the chief objections to using the crude drug.

Very few, if indeed any physicians could change the preparation used either from a solid to a fluid officinal one, or vice versa, with the assurance that in such change the alkaloidal value would remain the same. How much tincture is equivalent to so much extract, fluid or solid, to so much infusion, decoction, or vinegar, cannot be determined under our present pharmacopœial modes of preparing these officinal articles.

To obviate this difficulty the pure alkaloids are often used, and by dissolving known weights of this in a definite measure of a menstruum, or by mixing the alkaloids with definite weights of various solids, the dose of the active principle may be accurately apportioned.

But there are several objections against this plan. To obtain the alkaloid pure requires more chemical knowledge and skill than is sometimes possessed by manufacturers. The articles put on the market by different makers attest this. Then from the high price of the alkaloids, the liability to their adulteration is greatly increased, when, as in the case of atropia, the dose is so small as the one-hundredth or the one two-hundredth of a grain,

* Read at the Fourth Session.

a slight impurity or adulteration would greatly influence the result.

The use of pure alkaloids also prevents the druggist from making his own preparations. He may run out of a small stock of alkaloids from a sudden demand, and then would be unable to fill the prescription sometimes for several days.

Another objection to the use of the pure alkaloid is in many cases the virulence of its action. Take emetina, for instance, where this uncontrollability of its action is the main obstacle of its employment. It is nearly always found that the use of the alkaloid in its natural combination is the most reliable, least irritating, and best tolerated form in which it can be used.

The object, therefore, presented for consideration is, how can a series of preparations be obtained from the various drugs having a certain definite agreement between the solid and fluid forms, at the same time possessing the mild and reliable characters of the crude article, and containing in each approximate known quantities of the natural principle or alkaloid.

In such a process the first step would be to obtain the alkaloid in solution in a proper menstruum, capable of extracting the alkaloid from the herb thoroughly. Then the alkaloid should be precipitated as nearly as possibly free from the other substances dissolved at the same time with it. Then this precipitate, after being dried at the lowest possible temperature, may be redissolved in a definite measure of liquid or mixed with a definite weight of a suitable solid substance. It is most probable that in making these preparations it would be advantageous to use some of the vegetable acids, and if such be the case, it is by no means necessary to restrict ourselves to the few now in use. The vegetable kingdom abounds in them, and they are only awaiting further investigation.

Henbane, belladonna, conium, stramonium, ipecacuanha, colchicum, euonymus, digitalis, aconite, squill, and the bitter tonics are some examples of the drugs alluded to.

If this can be satisfactorily accomplished a great benefit will be conferred upon prescribers, for the large bulk of worthless preparations now found on the druggists' shelves will be dispensed with, while the drugs themselves can be more intelligently used, as their physiological effects can be more readily observed.

II. MATERIA MEDICA.

ANALYSIS OF ERIODICTYON CALIFORNICUM.*

BY CHARLES MOHR.

QUERY 4.—*Eriodictyon Californicum* is receiving attention for its action in lung diseases and bronchial affections. What is its therapeutical value, and to what is its activity due? Make a chemical examination of it.

IN reply to this query it was found necessary to subject the plant to the regular course of analysis followed in the separation of the organic constituents of plants.

Ten grams of the air-dried herb, of good quality, successively exhausted by pure ether, alcohol of 95 per cent., and distilled water yielded the following results:

1. The ethereal percolate, evaporated spontaneously, and finally by application of gentle heat, was mixed with water. A copious precipitate of resinous matter occurred; the supernatant aqueous liquid, after having been freed from suspended resin, was of a very pale straw-color, slight taste, and faint acid reaction.

A. Examination of Resinous Precipitate.—By treating with boiling alcohol of 70 per cent. for an hour, and subsequent maceration at a low temperature for twenty-four hours, filtering and washing the undissolved portion with alcohol of 70 per cent., and digesting the concentrated filtrates with animal charcoal, evaporating and exsiccating over sulphuric acid, a brittle resin was separated, having a yellow-greenish color, slight acid reaction, aromatic, acrid, slightly bitter taste, faint odor, and fusing at about the temperature of boiling water. The portion left undissolved by alcohol of 70 per cent. was treated with hot alcohol of 95 per cent. as long as this dissolved any of the material.

A grayish, soft, and tenacious substance was left, not volatile on stronger heating, fusing, and burning with a smoky flame, destitute of taste and odor, insoluble in alcohol, partially soluble in petroleum-naphtha, ether, and benzol, readily soluble in chloroform, and in a mixture of carbon di-sulphide and absolute alcohol, which facts prove its identity with caoutchouc. From the hot alcoholic solution, on cooling, a soft, waxy substance separated, forming a pellicle; this substance, freed from adhering resin by

* Read at the Third Session.

continued washing with cold alcohol, possesses a greenish-white color, proven to be a vegetable wax. The quantity obtained was too small to permit a closer study of its properties. The remaining alcoholic liquid was of a dark-green color, possessing no peculiar taste or odor, and was completely decolorized by animal charcoal, and could not be regarded as a resin proper but as inert coloring matter.

B. *Examination of the Aqueous Liquid.*—No crystallizable substance was obtained, and on application of the proper tests no indications of an alkaloid or nitrogenous compound was obtained. The acid, found present in small quantity, proved to be a tannic acid, precipitated by ferric chloride, almost black in color.

2. The *alcoholic* percolate was evaporated to a small bulk and mixed with water.

The insoluble resinous portion obtained consisted entirely of coloring matter; its alcoholic solution, being without taste or odor, was entirely decolorized by animal charcoal.

A portion of the aqueous liquid, after being entirely freed from resinous coloring matter, was concentrated by slow evaporation and left on ice for several days. It yielded no crystals, and the application of alkaloid tests led to no results. To be firmly convinced on this point a portion of the liquid was digested with oxide of lead to remove tannic acid, the filtrate evaporated to dryness and extracted with hot alcohol of 95 per cent.; the solution, on spontaneous evaporation, left no residue. Another part of the same liquid was examined for organic acids; a tannic acid was found which precipitated ferric salt green.

To separate the organic acids, lead acetate in solution was added until further addition produced no precipitate; filtered; the filtrate was treated with ammonium hydrate to a still, feeble acid reaction, and, on addition of acetate of lead, no turbidity was produced, thus showing all organic acids present were contained in the lead precipitate, which is absolutely insoluble in boiling water.

The lead precipitate was dissolved in acetic acid, reprecipitated by ammonia, carefully washed, and, whilst still moist, mixed with absolute alcohol and decomposed by means of sulphuretted hydrogen, filtered, and the filtrate evaporated to dryness at a low temperature; the tannic acid was obtained as an amorphous, brittle substance, of a clear yellowish-brown color, having an astringent, acidulous taste. It was perfectly soluble in alcohol; yielding a turbid solution with water, which, on addition of so-

lution of the alkalies turned to a deep reddish-brown color, and became perfectly clear.

Ferric chloride gives a green precipitate, turning to a dirty gray after standing; it is dissolved by ammonia, yielding a solution of a dingy purple color, and is decolorized by oxalic acid.

Sulphate of cinchonia gives a copious white precipitate.

Plumbic acetate yields a golden yellow precipitate, not dissolved by potassic hydrate.

Plumbic subacetate yields a dingy yellow precipitate, soluble in potassic hydrate.

Tartar emetic, no precipitate.

Glue, no precipitate.

Hydric sulphate dissolves it with a deep crimson, somewhat purplish color.

Argentie nitrate: on heating, the metal is partly reduced in the specular form.

Diluted hydric sulphate when added to either alcoholic or aqueous solutions shows a peculiar behavior by rendering the solution at first milky-white, and, on short standing, a viscous brownish mass separates. Fehling's solution then added, copper is reduced.

This decomposition, effected by diluted sulphuric acid, takes place very rapidly at ordinary temperature, and this fact, and the general behavior to other reagents, proves it to be a glucoside of the tannic acid series of decided peculiarities, closely allied, if not identical, with that found by the writer existing in *Pycnanthemum linifolium*, and, perhaps, existing in *Ballota vulgaris*, and *Leonurus cardiaca* (Rochleder).

To obtain the acid in sufficient quantity so as to be able to study its properties more closely, and particularly to satisfy myself that it is not associated with any other solid organic or volatile acids, such as benzoic or cinnamic acids, a fresh quantity of dried herb was extracted by alcohol of 75 per cent. The alcoholic extract, freed from resin by addition of water, was treated with plumbic acetate, the precipitate dissolved in acetic acid, reprecipitated by ammonia, decomposed by sulphuretted hydrogen under absolute alcohol. The acid so obtained, tightly inclosed between two well-fitting watch-glasses, was exposed to a temperature of 220° to 240° C. for some time. As no sublimation took place the absence of all solid volatile acids of the aromatic series was proven.

3. *Treatment of the Herb with Water.*—The aqueous percolate of the herb, previously exhausted by ether and alcohol successively, was of a brown color, showed acid reaction, and possessed an astringent bitterish taste. The examination was conducted the same as in the case with the liquid under No. 2; the same tannic acid was alone found. A portion of the percolate, concentrated by evaporation, gave, on addition of absolute alcohol, a copious precipitate, readily soluble in water, and proved to be gum associated with a brown inert matter. Sugar in small quantities was detected. No alkaloids or nitrogenous body could be detected.

Ten pounds of the leaves subjected to distillation with water yielded a distillate containing very small quantities of a volatile oil, adhering to the sides of the receiver, and forming a very thin layer upon its surface, too minute to allow of a separation and subsequent nearer investigation. It imparts to the distilled water an aromatic odor and taste but slightly resembling that of the dried plant. Tested immediately after distillation it was found entirely neutral towards test-papers, and not the slightest reaction was obtained with any of the alkaloid tests, so that it may be safely asserted that the plant *does not* contain any volatile alkaloid.

By these results it was ascertained that *Eriodictyon Californicum* contains :

Volatile oil in small quantity, not further examined.	
Moisture,	12.50
Matter extracted by ether. Consisting of a bitter, acrid, brittle resin, 8 per cent.; inert green coloring matter, caoutchouc, wax in small quantity; tannic acid in small quantity,	14.98
Matter extracted by alcohol. Consisting of inert resinous matter, decolorized by animal charcoal; a peculiar glucoside, of the tannic acid series, predominating in the mass,	10.79
Matter extracted by water. Consisting of same tannic acid above mentioned; gum; brown, extractive, inert substance; trace of sugar,	18.42
Wood fibre and ash,	43.81
	<hr/> 100.00

From the above analytical results it is evident that the therapeutical value of the plant rests solely upon its stimulating and astringent effects upon the mucous membrane of the respiratory

apparatus, especially the bronchial tubes, due to the action of the brittle, acrid resin exciting secretion and promoting expectoration, the astringent tannic acid imparting tone and solidity to the membrane in a state of relaxation. How far, in this respect, the drug will prove to be equal or superior to the numerous remedies of like therapeutic effect, and how far its reputation amongst the people of the country where Yerba Santa is found indigenous is sustained when employed by the profession, must be decided by the practitioner.

In this locality the fluid extract of the herb has been used by some physicians quite extensively. A medical friend who has used it on the strength of its repute, and given it what he considers a fair and searching trial in lung and bronchial affections, did not find his expectations realized, and has since dropped the use of it as possessing no advantage over the remedies to which he heretofore had recourse.

The results of my experience show that a menstruum of alcohol of 70 to 75 per cent. yields the best preparation.

MOBILE, September 6th, 1879.

III. CHEMISTRY.

HYDRATED OXIDE OF IRON.*

BY J. U. LLOYD.

WHEN intended for the preparation of scaled salts of iron, I prefer to follow the following process in which the oxide is washed by decantation, and the word *cold* inserted wherever water is used, thus differing from the process of the Pharmacopœia.

“To the water of ammonia previously diluted with two pints of cold water, add, stirring it constantly, the solution of tersulphate of iron, previously mixed with four pints of cold water. Then pour the whole on a wet muslin strainer, and return the precipitate when drained to the vessel, and intimately mix with sixteen pints of cold water and again drain upon the strainer. Repeat this latter operation, and when well drained the oxide will be ready for use.”

The above will not separate all the sulphate of ammonium, but the little remaining is not objectionable. In practice, hydrated

* Read at the Fourth Session.

oxide of iron may differ very much as to solvent power, although apparently prepared strictly according to officinal directions.

This variation, I am convinced, generally results from variation of temperature applied to the oxide either during preparation or subsequent washing. It is absolutely necessary that the oxide dissolve perfectly in solution of citric acid, and if the solution of tersulphate of iron be mixed with water above a certain temperature and the precipitate afterwards washed with water likewise warm, trouble may be encountered, as a portion of oxide (probably an oxyhydrate) of a brickdust color, sufficient to disarrange the proportions, is liable to remain. (See remarks of Professor Maisch in *National Dispensatory*, first edition, p. 625.) As prepared by the formula before given the precipitated oxide will be of a dark liver-brown color, of a gelatinous consistence, perfectly free from spots of a light-brown color, and entirely soluble in citric acid solution. It will be necessary to remove the precipitate from the strainer after each operation, as soon as the liquid disappears below the surface, thus preventing the edges of the precipitate from becoming of a firm consistence and escaping future washing.

If sulphate of ammonium in any considerable amount remains in the oxide after the solution of citrate of iron and ammonium is spread upon the glasses, minute crystals of the aforementioned salt will form and prevent the citrate from scaling; therefore, without regard to contamination in a therapeutical sense, it is necessary to wash the oxide in a manner that will always insure the removal of the large excess of this substance.

CITRATE OF IRON AND AMMONIUM.*

BY J. U. LLOYD.

THIS is directed to be prepared by the *Pharmacopœia*, of "solution of citrate of iron." I will refer to the entire process, as it is best, I am convinced, to make the salt directly from the solution of tersulphate.

After preparing the hydrated oxide of iron we are directed to "put half of it into a porcelain capsule on a water-bath heated to 140°, add the citric acid, and stir the mixture until the precipi-

* Read at the Fourth Session.

Add the ammonia water to the citric acid until in slight excess, then evaporate the solution until it measures sixteen fluid ounces. Then take of solution of

Tersulphate of iron,	f ℥ xvi
Citric acid,	iv oz. av.
Distilled water,	
Water of ammonia, aa,	q. s.
Solution citrate ammonium,	f ℥ v

Prepare hydrated oxide of iron from the solution of tersulphate of iron. Having drained it, place in an evaporating dish and add the citric acid. Warm upon a steam or water bath, and stir until the citric acid is dissolved, then add the solution of citrate of ammonium, and stir until the hydrated oxide is dissolved; filter, evaporate to the consistence of thick syrup, and spread upon glass with a brush, and dry. The yield will be, as taken from my laboratory notebook, 4234 grains.

It will be noticed that the foregoing necessitates the preparation of solution of citrate of ammonium, the object being the addition of a fixed amount of ammonia to the citrate of iron without regard to strength of water of ammonia employed.

CITRATE OF IRON AND QUINIA.*

BY J. U. LLOYD.

REGARDING the addition of the quinia to the solution of citrate of iron and the preparation of the alkaloid of quinia from the sulphate, I beg leave to call attention to the remarks upon page 107, American Journal of Pharmacy, March, 1876.

The dry salt, according to the officinal process, is scarcely marketable from difficulty of solution. If ammonia water be diluted to a considerable extent, and very slowly added to ice-cold solution of citrate of iron and quinia, with constant stirring, it will combine to the extent of one-half the amount required for preparation of soluble citrate of iron, without permanently precipitating the alkaloid. The product will be quite soluble, and not deliquescent, but may scale with some difficulty, as is gener-

* Read at the Fourth Session.

ally expected from this salt. It is particularly desirable that citrate of iron and quinia should represent a definite amount of quinia, and it would seem that some discrepancy may possibly result from variation of proportion of oxide employed to prepare the present officinal solution of citrate of iron, although from reasons before stated either a large excess or deficiency will be attended by inferior scales and an increase of labor.

TARTRATE OF IRON AND POTASSIUM.*

BY J. U. LLOYD.

THIS, as prepared according to the Pharmacopœia, receives the criticisms of dispensers from reason of its slowness to dissolve. This trouble may be easily overcome with slight change of constitution, without, however, in any way interfering with therapeutical value.

Take of Solution of tersulphate of iron,	. . . . .	9 parts.
Cream of tartar,	. . . . .	4 parts.
Distilled water,		
Water of ammonia, aa,	. . . . .	q. s.

Prepare hydrated oxide of iron with the solution of tersulphate of iron, and add to 32 parts of distilled water, in a porcelain or stone vessel. Heat the mixture by means of a water or expanded steam bath, add the cream of tartar, and stir until the hydrated oxide is dissolved.† Filter the solution while hot, remove to a

* Read at the Fourth Session.

† Upon a larger scale than ordinary I suggest the following: Add the cream of tartar to the hydrated oxide of iron within a stone or porcelain evaporating basin, heat to 180° F., and stir until the oxide is dissolved. Decant the liquid after permitting the excess of bitartrate of potassium to subside (maintaining the temperature), and after the decanted liquid has remained in a cool situation 24 hours pour into it ammonia water q. s. to dissolve the mushy yellow magma, stirring constantly. Then evaporate to proper consistence and scale.

There will be about 20 per cent. of the cream of tartar subside after the hydrated oxide dissolves. This can be used in subsequent operations. It is advisable to use an excess, as the oxide dissolves very slowly in a weak solution of bitartrate of potassium, and a long-continued heat has a tendency to render a portion of the iron basic and insoluble.—J. U. L.

cool situation, and allow to stand from 12 to 24 hours. It will now contain a heavy brickdust-colored precipitate. Stir the mixture well with a wooden or porcelain spatula, and with constant stirring very cautiously add ammonia water until the precipitate dissolves. Then evaporate in a porcelain dish to proper consistence, spread upon glass, and dry.

It is absolutely necessary that the water of ammonia be added only in sufficient amount to dissolve the reddish precipitate (very small proportion), for if in excess decomposition ensues, the solution turns black, deposits a quantity of a gelatinous, tarry precipitate, and when dry will neither scale from the glass nor redissolve in water with any satisfaction. As prepared according to the foregoing formula the salt will at once dissolve in half its weight of cold water, and is almost tasteless, simply imparting a slight sweetness, not at all disagreeable. The yield will be five parts. It contains a very small amount of ammonia in combination, which may necessitate alteration of name.

With regard to this article I will call attention to the paper from Mr. G. H. Charles Klie, in the American Journal of Pharmacy, 1876, April, p. 170, the only printed notice that has ever come under my observation.

Necessity had compelled me to prepare, for some years, by demand of the trade, a more soluble article than the Pharmacopœia process produced, and doubtless others likewise can certify to the correctness of Mr. Klie's conclusions.

MINUTES
OF THE
TWENTY-SEVENTH ANNUAL MEETING.

First Session.—Tuesday Afternoon, September 9th.

THE Association met in the hall of the Supreme Court, in the city of Indianapolis, and shortly after three o'clock was called to order by the President, Gustavus J. Luhn, of Charleston, S. C., more than a quorum of members being present; John M. Maisch, Secretary.

Mr. J. B. Dill, of Indianapolis, addressed the chair as follows:

MR. PRESIDENT AND GENTLEMEN OF THE ASSOCIATION:

In behalf of the resident members of the Association and the Local Committee of Arrangements I have the pleasure of introducing to you the Hon. John Cavin, Mayor of the city of Indianapolis, who will address this honorable body by way of welcome to the capital of the Hoosier State.

Mr. Cavin said:

MEMBERS OF THE AMERICAN PHARMACEUTICAL ASSOCIATION, IN YOUR TWENTY-SEVENTH ANNUAL CONVENTION ASSEMBLED

GENTLEMEN: I find myself at this hour enjoying the privilege and pleasure of greeting the representatives, in convention assembled, of one of the most important branches of our national commerce—one, perhaps, that enters into and mingles as intimately as any other with the affairs, wants, and necessities of the whole people, dealing even with their health and lives, and one requiring a high order of skill, knowledge, and integrity.

One of the purposes of your meeting I find to be "To create and maintain a standard of professional honesty equal to the amount of our professional knowledge, with a view to the highest good and greatest protection to the public."

This, gentlemen, is a noble declaration of principles. It would be well could the standard be raised higher in every other pursuit and profession, and

I hope and believe our home friends have made every preparation for your comfort and pleasure. and hoping you may accomplish all and more than you expect I extend to you to-day a cordial welcome to our city.

In ancient times medicine was an occult science, and the alchemist lived in his laboratory among his crucibles and athanor, lit up with never-dying flame, and seeking to gather from out their vapors the elixir of life immortal, and to him the people looked with a devout confidence as one possessed of more than mortal knowledge; and as the Persians, Chaldeans, and Egyptians of old looked to the magician to extract health and life-giving secrets from the herbs that grew, so do the people of to-day look to the pharmacist with almost equal trust, in the hour of sickness and agony drinking without a doubt of the potions you have mingled. And may we not hope that in the long course of centuries of study and experiment that the groping alchemist of the past has become the chemist of exact science of to-day, and that such progress has been made that we may rely in confidence that the healing stores of nature have indeed been opened, and that the elixir of health indeed been found. To you we look "for confections after the art of the apothecary, tempered together, pure and holy." To you we look for balm from Gilead.

The magician of the past indulged in vain hopes of discovering the elixir of life that would make man immortal upon earth, and the chemist of to-day, while not wrapped up in these delusions, still hopes by patient labor to unfold health-giving secrets, to alleviate suffering, prolong life, and confer great blessings upon mankind, and could you teach the people that not alone in steaming crucibles from precious herbs, but from out the pure air, the glad sunshine, the sweet waters from rivulet and fountain, simple food and temperate habits, an upright walk before God and man, and a good conscience—that from these is distilled the real elixir of health, happiness, and life, not immortal here, as hoped the dreaming alchemist, yet fitting for the beyond; that here the maiden gathers roses for her cheek and love-light for her eye; that from out these the youth knit sinews and thews for arm and thigh; from these come the blood that courses noble veins and pulsates brave and generous hearts; from these transformed the fibres of the independent spirit that dares and will be free; from these leap the inspirations that bring us nearer the Omnipotent; from these are kindled the electric fires that light the torch which genius bears far in the van of every age to illumine the path which truth will fearless tread, where error dares not follow, and the higher magicians, the law of physical nature and the moral law of mind and soul, standing perpetual watchers by these indestructible crucibles of right and athanor, ever burning with quenchless, sacred fire, in which the false perishes like stubble, and the truth, like gold, comes brightest and purest from out the flame which is fiercest. Could you teach the people these simple truths, that from what we eat and drink, from these daily habits come important results, moulding, making, and marring, not merely the physical, but through it the mental and spiritual; not merely the earthly, but the celestial and Godlike within us; not merely for time, but for eternity; that through the sublime chemistry of natural laws earthly elements, at the magic touch of rainfall, dewdrop, and zephyr's wing, combined with unseen elements from out the air, and from the grain of wheat and the blade of grass, the water that fell

from the sky, is drank by rootlets far under ground, and flowing up through ducts of tree and shrub and out to every twig and tip, and from passing winds gathers tribute for bud and flower, and fruit and color, too—green for leaf, crimson for flower, and gold for ripening; and these again combined into the crumb of bread, to milk, and flesh; and these again into human muscles, blood, and brain, and through these again is further transmuted in the oration of the statesman, the demonstration of the logician, the pleadings that make men weep, and the jest that makes them laugh. These supply the wisdom of the philosopher, and the verse of the muse of song, and eloquence to the tongue, the softened tones of love and the fierce cry of revenge; the command that hurls legions to the battle front and inspires the spirit to die for a cause; from these the genius of the great soldier and the wise ruler; from these, perverted and unperturbed, prayers and cursings, malignity and murder, beauty and deformity, and all human action, great or small, good and evil, may come from the perfect or imperfect chemical combinations. For to all these earth and dust and phosphates and salts and lime are necessary to produce the result of man and animal life, and it may be from the peculiar perfect conditions and combinations of visible base elements with unseen ethers that one man differs from another, that the heart throbs, the nerves feel pain or pleasure, the brain reasons, the eye sees, the ear hears, that we are capable of sensibilities and emotions.

Without these combinations with these common earths, Cæsar was not. Without them Socrates, Plato, Confucius, Washington, and Napoleon were not. Without them Christ incarnate was not. The grand truth, the never-dying conception, the statue, the painting, the magnificent temple, are the children of these conditions, and the inspirations which conceived and builded them may have been drawn from the grain of corn, the potato, or the turnip, and they being earth and water, and thus from the very clods of the valley peopling eternity with immortals.

Mind can only act through matter, and that matter must be in certain forms combined by the mysterious chemistry of nature. Consume in fire the noblest heart that ever throbbed, and a little ash remains. The mightiest brain is made up of albumen and fat, and phosphorus and acids and salts, and sulphur and four-fifths water; materials running in your rivers and gutters, are to be had in commerce by the ton. Derange the form of the skull and you produce suffering and derange the mental functions. Burn the skulls of Solomon and Socrates and all that is left is a little lime; destroy from the earth this one common mineral, lime, and animal life could not be; or take away from that solid stone its quality of ready solubility in the stomach, and we would be, if at all, without bones, beauty, without teeth, and the egg without its cunning covering; and yet all the immense quarries of this stone in the world with the proper conditions could be converted into bones, and teeth, and human skulls. And may we not readily believe that the air or the invisible is as full of the combining elements as is the earth, as would thus combined transmute them all into living beings; and hence in our rivers that flow, the rocks beneath, and the air about us is a vast reservoir of sleeping life, or of materials capable of being vitalized, and then perpetually procreating, and that every time a child is born by this combination of the earthly

and the ethereal elements, an immortal being has been created. Man and woman meet in love; and lime, and iron, and oxygen, and hydrogen, and electricity combine into a living man, and that into an immortal being, yet to look upon the infinite and sit by his throne, and hence there is no death. Even the rocks disintegrate into soil, producing food for man and forming into organisms that breathe and live. The wind that whirls about the mountain top combines with the shattered rocks at its base and becomes man; that earthly element becomes a sensate thing, that broken, suffers agony, and the dissolution of this combination is that thing which all, man, beast, bird, and insect fear,—that terrible thing called death.

The telephone speaks with a voice as if from out the spirit-land, as though we were almost holding converse with the infinite, or guardian angels were bearing our messages through the sky. Take it apart and it is a few pieces of iron, senseless and dumb as clods.

There are sweets and fruits and spices and perfumes in the earth and air, but no art or laboratory of man can extract them—the cane, the tree, the shrub are the magician's rods on which alone they cluster. The flower alone can gather these perfumes.

You, by your art and from out your crucibles, seek to distil elixirs that will bring life and health to heal and perfect the physical, and minister to a mind diseased where nature's wonderful alchemy has failed; but as man is physically a chemical result of what he eats and drinks, and out of that in large measure comes his mental, moral, and emotional nature, the grandest pharmacy would be to teach the people how and what to eat. Wholesome food being nature's condition of health, yet the supreme pharmacy of all is to live a life of moral purity, thus blending into unity the earthly and seen with the spiritual and unseen. Let the trials of life come fiercely if God wills. It may be for the best. In gold from half-heated crucibles dross is found. Each one of us is feeding fuel to his own athanor—each one tending the crucible in which his own destiny is being moulded. If sin and wrong are mingled therein not thereout can come the elixir of life, but only poisonous dregs of suffering and death.

Could you teach the people these simple truths little need would we have for drugs; but that, perhaps, is one of the impossible things. We defy, in vile indulgence, every known law of health, and the glutton, the drunkard, and the licentious expect to find in some pill or powder that health for body and mind that can only be found in the God-given medicines of pure principles and a virtuous life, in which alone is distilled the elixirs of that other life which is immortal.

The address of Mayor Cavin was greeted with general applause, and appropriately responded to by the President.

The credentials of the delegates accredited to this meeting were handed to the Secretary, and a Committee on Credentials, consisting of Messrs. A. E. Ebert, of Illinois; T. Roberts Baker, of Virginia; and J. L. Lemberger, of Pennsylvania, was appointed by the chair. The committee retired for the purpose of

examining the credentials, and the President delivered his annual address as follows:

PRESIDENT'S ADDRESS.

GENTLEMEN OF THE AMERICAN PHARMACEUTICAL ASSOCIATION:

The time has again arrived for our annual meeting, and it is my pleasure and duty as your presiding officer, when about to retire from the honorable position in which your good-will and sufferance have placed me, to give some account of my stewardship, and, according to our constitution and by-laws, to make such recommendations for the future government and welfare of this Association as in my judgment are necessary.

The routine of labor which the Association requires of its officers is so perfect in all its branches and details that any alteration would appear to me to be injudicious, so that no recommendation on my part could improve it; hence there is little or nothing which my humble self could add or do to insure a more perfectly harmonious working of your Association. All your officers, intrusted with any responsibility or duty for the good of this society, do and have done their labors faithfully and cheerfully. It was a matter of regret to me, as well as to others, that the Proceedings of our last meeting did not make their appearance in print among the members earlier than July, but the delay must be largely attributed to the postponement of the Atlanta meeting, and the consequent disarrangements in the duties of our Permanent Secretary, who has already given you some reasons in the preface to the last volume of the Proceedings, accounting for the delay.

But all who have felt annoyed by the long delay could not but be gratified by the work itself, a book comprising nearly one thousand pages in print, and the largest ever issued by this Association.

There are many valuable reports contained in this publication, showing the great interest which members manifest in our objects, and diffusing the knowledge which they individually possess, and which they have attained by diligent work and study.

The report on the Progress of Pharmacy, which is very elaborate and must have cost our worthy reporter many days of patient hard labor, was ready in September, when the meeting should have been held. I feel convinced that we may in the future look for much valuable and instructive information from this department.

Also the report of the Committee on the Revision of the Pharmacopœia deserves to be mentioned. It is plain and exhaustive, and the recommendations contained therein are worthy of adoption.

It has been suggested to me, and upon consideration I fully concur with the desire expressed, that our meetings should be held at an earlier period of the year. At the last meeting at Atlanta a movement was made towards this end, and it was agreed that meetings, if held in a Southern State, should be held in the month of May, as any other time of the year would debar Southern cities from having meetings held in their midst, owing to the fact that the fall months generally bring along with them sickness and malaria, so

that it would not be safe for unacclimated persons to go there during that time. While this cannot possibly apply to every portion of the South, yet it would be safer and more acceptable to the visitors if these meetings in Southern cities could be held even earlier than May.

But apart from any action we may take with a view to benefit our Southern friends in their own midst, it has been intimated to me and meets my approval, that the time for holding meetings of our Association should be changed for the benefit of our Eastern and Western friends also. If these meetings were held a month sooner, it would, I believe, insure us a larger attendance. The present time of meeting practically excludes attendance of a large proportion of our Southern and Western members, it being at a season at which, if there be any sickness, it is at its height, and members are loath to leave their posts of duty. When we further consider ourselves in the light of merchants, an earlier period would suit better in consequence of the opening of fall trade in the beginning of September; and as we are bound to live by the sweat of our brow, we must be sure to be on hand early in the season in order to reap the full benefits of that trade.

The financial state of our Association is another point upon which I have a few words to say, a matter that will be brought to your notice in one of the sessions, and upon which some decisive action must be taken during this meeting. Several plans have been suggested to meet a deficiency which is staring us in the face, but as yet nothing definite has been decided upon. I would suggest that the amount sufficient to defray any deficiency in our treasury shall be met at once either by assessment per capita, or otherwise, and that we should not allow this matter to engross the attention of the Association from year to year. If this deficiency is met otherwise than by assessment be careful that it be done in such an effectual manner as not to embarrass the Association in after years by conferring privileges or other rights upon any of those who are now members by the payment of a sum of money which would only temporarily relieve the embarrassment of our treasury, but might in the end prove a burden upon us. Rigid economy in our expenditures behooves us to lighten the burden upon the members as much as possible, and I am pleased to state that your Permanent Secretary will submit some plan or proposition by which at least a few hundred dollars can be saved annually in the expenditures of the Association.

The Centennial Fund is another subject which requires a passing notice at my hands. I do not wish here to review the cause or object of the establishment of this fund. I take for granted that you all know its conditions and purpose; my only object is to make an appeal in behalf of it.

It is certainly not creditable to our members that this fund has not been completed. It reflects upon us in such a light as if the generosity which prompted its establishment by the Local Committee of the Philadelphia Druggists had not been duly appreciated by this Association. The time for its completion has once already been extended for a year, and I sincerely hope that we shall not be again forced to ask further extension, or even to be compelled to abolish it. If every member of the Association would give but a small amount towards its completion would be a fixed fact, or if members present at this meeting would contribute something towards it it could be so nearly completed that no compunction would be felt to ask for another exten-

sion of time. As the matter stands now, unless some considerable accession is made to the fund, I am afraid that it will fall through. The amount requisite to be made up is \$525, a like amount having been contributed by the Local Committee of the Philadelphia Druggists. Of this sum, at the latest advices which I had from Mr. G. W. Kennedy, the custodian of the fund, only \$170.50 has been collected, leaving still a deficit of \$354.50.

My object in directing your attention to this is to stimulate members to contribute, cheerfully and voluntarily, whatever amount they can afford to so worthy an object.

We are assembled here to-day to commemorate the twenty-seventh anniversary of our Association. Twenty-eight years have elapsed since a handful of druggists came together for the purpose of establishing a society to guard against the importation of inferior drugs, and thereby to prevent the vending of spurious and adulterated medicines. The association formed in 1852 is the American Pharmaceutical Association of to-day; from a membership of scarcely a dozen it has grown to a membership of twelve hundred. The object of the Association has also changed; for, although still keeping its original intentions and purposes in view, it has, from a mere trade association, risen to the dignity of a scientific one. Our meetings are now held all over the length and breadth of our country. It has been but two years since we met and received the hospitality of our friends in Canada, where we experienced the pleasant effects of a northern clime; and less than a year has passed since we met in that great centre of the sunny South, Atlanta, Ga., where we enjoyed Southern hospitality to its full extent.

To-day we meet in this great Western railroad city, Indianapolis, and I feel satisfied that when we leave here, we shall carry with us the most pleasant recollections of our visit and the welcome extended to us by our Western friends. At each and every one of these meetings we meet new faces and make new acquaintances, because, although many of our members deem it their duty to attend our meetings, even from great distances, yet the great majority of those present is naturally composed of those who live in the vicinity of our annual places of meeting. The social intercourse thus annually established among members is a great feature of this Association; it brings together pharmacists residing in all parts of the country, and often more than ordinary friendships result from our intercourse. Exchange of courtesies is often the result of these acquaintances by rendering services or imparting information which could only be obtained in the particular section of country to which each one belongs. I am continually in receipt of letters from members of this Association, some from acquaintances made at different places of meeting, some from parties personally unknown to me, but based upon a brother membership of the American Pharmaceutical Association.

These meetings, however, are far from being mere gatherings for social intercourse or merry-making, or for diffusing knowledge among ourselves alone. The Association has a large field for labor, and a far-spread influence upon the community at large; and this influence is felt throughout the whole extent of our country.

Little did the originators of this Association, twenty-seven years ago, think that their work would be crowned with such success as it has achieved. Some

of the founders are still with us to see the progress of the work they have begun.

How different is the pharmacy of to-day from what it was in years gone by ! I will not tire you with facts you are all acquainted with,—the extent to which the different preparations have been changed in the past twenty-seven years, or what progress has been made in the manipulation of the different drugs to obtain satisfactory results ; nor do I wish to encourage the manufacture of the so-called “ Elegant Pharmaceutical Preparations,” or the different malt preparations, with their combinations, furnished in an already prepared state, which devolves no work or science upon the apothecary, except the art of pouring them from one bottle into another, and charging his “ one ” per cent. profit upon them. This, gentlemen, although progress in manufacture, is no advancement of the cause of pharmacy, nor is this body responsible for such a state of affairs.

No ! This Association has been the means of advancing pharmacy in the United States from a mere trade to the highest standard of a profession.

The pharmacist of to-day, nearly throughout the whole of this country, has to possess a certain educational qualification in order to enable him, or even to permit him, to practice pharmacy. Boards of pharmacy, or pharmaceutical examining boards, exist in many of the States, generally under the supervision of State authorities, or by appointment of governors, and in some instances the powers have been delegated to pharmaceutical associations or colleges of pharmacy, who are working under charters of their respective States, to examine all persons practicing or wishing to practice pharmacy as to their qualifications to fit them for the position which they wish and ought to occupy towards the community, and especially towards the medical profession. These restrictions upon the indiscriminate practice of pharmacy have brought about very flattering and encouraging results. It has been the means of filling our colleges of pharmacy with students eager and anxious to have the affix of Ph G. to their names, and above all it has compelled young men who choose pharmacy as their vocation in life to prepare themselves for it by diligent study.

To be able to pass successfully one of these pharmaceutical licentiating boards candidates are compelled to know, at least, the rudiments of chemistry ; they are required to make themselves acquainted with the contents of the Pharmacopœia, the Dispensatory, and other books of information ; they learn incompatibilities and know the reason why they are such ; they are compelled to know something of botany, and to distinguish the most common roots, barks, and resins at sight, and are required to know the most accessible antidotes to poisons. This and more they are expected to study in order to be entitled to a license as apothecary.

In speaking of these qualifications of course I am only able to judge from my own experience of what is required by the pharmaceutical examining board in my own State, and of which I have the honor of being a member ; but it is fair to suppose that these requirements are none too many, and that they are about the average of what is required from applicants for license wherever these boards exist, and it is to be hoped that ere long every State in

the Union will be able to boast of an examining board for licentiates of pharmacy.

I am well aware that it is not within the province of this Association to bring it about, but it would be desirable if these boards in the different States could unite in some concerted action, and form themselves into an association similar to that now in existence composed of the teaching colleges, to arrange a uniformity in the examinations, and that certificates of licenses of one board should be recognized by all the others.

This compulsory education is a great stimulus to our young men who are growing up, and who are in time destined to take our places. Heretofore, it seems, young men, after serving a short time, in some instances but a few months, in a drug store, have considered themselves able and competent pharmacists, have gone forth into the world as such, have entered into business on their own account, and, perhaps, possessing pleasing and agreeable manners, have to some extent been successful; but, as they neglected their books, they did not understand what they were doing, so that, in fact, their whole ability and knowledge consisted in the mechanical compounding of ingredients. They were thus compelled to buy everything in their store, even the most common preparations, from the manufacturers, and although many of the latter are undoubtedly men of character, and their products above suspicion, yet the great stimulus of pecuniary gain, by buying cheap, has induced many of these young men to fall into the hands of unscrupulous vendors, who sell inferior articles, apparently cheap, but unreliable as to strength and quality; all which is the result of their own inability of producing them themselves.

It has been universally my experience that the possession of knowledge acts as a stimulus to enlarge that knowledge, so that young men who study in order to graduate in pharmaceutical colleges, or to pass before pharmaceutical examining boards, will not only find their labors rewarded by being able to pass the examination, but also will rarely throw their books aside afterwards, but continue to study, finding how easy it is for them to master a subject after the foundation of knowledge has once been laid. Experiments are made, one after another, and thus they learn to love their chosen vocation more from day to day, and the bright future of becoming prominent in their profession lies before them; and, gentlemen, you cannot deny that this Association has laid the foundation for this state of affairs.

Another pleasing circumstance of the present time, and one which is in a large measure based upon the work which this Association has done and the salutary influence it has instilled into its members, is the accession of State pharmaceutical associations, springing up all over the Union, and increasing in number from year to year. It has been but a very short time since such associations have been formed in some of the most populous States, and the influence which these associations will in future exert must undoubtedly soon be felt all over the land. Petty jealousy will be discarded through the influence of these bonds of brotherhood, because all will work to the one end, namely, "the elevation of the profession of pharmacy."

I have tried to show what the American Pharmaceutical Association has done so far, but its work is not completed; we still have to toil on and do more than what we already have done. There are many more subjects to be

treated, and much future work could be laid out for this body, but all must come in time; still we must not shirk our duty; we must not think that one of us has done enough, let some one else do as much. Some of us are more gifted than others, and can do more than others. Do not let us relax in our attendance upon the meetings of this, our national Association, but let us rather by our presence give utterance to the great interest which we feel in our chosen vocation; let us take our young men, our clerks, by the hand, and draw them into this Association, so that they may feel that they belong to the profession and have a right to belong to this body. Do not let us grudge the amount which it may cost to attend these meetings. It will be a pleasure and a recreation for us all to get away from our places of business, where we toil from one year's end to the other, week-day and Sunday, to attend to the wants of the sick.

A few weeks spent away from our stores will invigorate us to be able to work with renewed energy; and do we not, besides, learn something at these meetings? Do we not carry home with us stores of information which will repay us for the outlay, not to speak of the recollections of the pleasures which we have enjoyed and the friends we have gained? And so may, then, also this present meeting prove as beneficial to ourselves and to our country as the former ones have been; may our deliberations be harmonious, and may we all, after our labors have been performed, return to our homes invigorated and with lasting memories of the pleasant days which it has been our privilege to spend together.

The Business Committee moved the appointment of a committee of three with the view of considering such recommendations contained in the President's address which may require the action of the Association, and to report thereon at a subsequent session. The motion was carried, and the chair appointed Messrs. Joseph Roberts, of Maryland; E. H. Sargent, of Illinois; and C. F. Hildreth, of New Hampshire, to serve on this committee.

The Secretary read a large number of invitations extended to members of the Association. On motion of Mr. Roberts, amended by the Business Committee, the invitations were received and referred to a committee of three, with the view, if possible, of making arrangements for visiting the various institutions and establishments, so as not to conflict with the business before the meeting. The motion was carried, and Messrs. J. M. Good, of Missouri, F. M. Harper, of Indiana, and C. W. Hancock, of Pennsylvania, were appointed this committee.

On motion of the Business Committee, the courtesies of the floor were extended to the faculties and members of the Medical College of Indiana, of the Central College of Physicians and Surgeons, of the Marion County Medical Society, and of the In-

dianapolis Lyceum of Microscopy; also, to his excellency, the Governor, to the State officers, and to the Judges of the Supreme Court of Indiana, and to his honor, the Mayor of the city.

Mr. Ebert, on behalf of the Committee on Credentials, read the following report:

The Committee on Credentials have examined the credentials handed to them, and report the following, viz.:

Massachusetts College of Pharmacy.—Samuel A. D. Sheppard, A. R. Bayley, Benjamin O. Wilson, George F. H. Markoe, Samuel M. Colcord.

Louisville College of Pharmacy.—Vincent Davis, John Colgan, C. Lewis Diehl, August Knoefel, H. H. Rademaker.

Maryland College of Pharmacy.—Louis Dohme, Ferdinand Hassencamp, Joseph Roberts, William Silver Thompson, Samuel Mansfield.

St. Louis College of Pharmacy.—William H. Crawford, James M. Good, Christian F. G. Meyer, Enno Sander, William S. Plummer.

Philadelphia College of Pharmacy.—Charles W. Hancock, James L. Patterson, Charles C. Spannagel, Alonzo Robbins, Charles L. Eberle.

Chicago College of Pharmacy.—E. H. Sargent, H. D. Garrison, Adolph G. Vogeler, R. H. Cowdrey, S. L. Coffin.

Cincinnati College of Pharmacy.—John F. Judge, George Eger, Joseph H. Feemster, J. D. Wells, T. L. A. Greeve.

College of Pharmacy of the City of New York.—Henry J. Menninger, Charles Rice, Starr H. Ambler, P. W. Bedford, Julius Jungmann.

Ontario College of Pharmacy.—Edward Harvey, William Saunders.

Connecticut Pharmaceutical Association.—Stephen Goodrich, Thomas F. Main, Dwight Phelps, W. A. Thompson, Emil A. Gessner.

Georgia Pharmaceutical Association.—John Ingalls, J. M. Solomons, J. W. Rankin.

New Hampshire Pharmaceutical Association.—Charles A. Tufts, Charles S. Enstman, John A. Wiley, Charles F. Hildreth, George F. Underhill.

Pennsylvania Pharmaceutical Association.—Charles A. Heinitsh, George Ross, Joseph L. Lemberger, Samuel Gerhard, George A. Kelley.

Kentucky Pharmaceutical Association.—William H. Averill, John J. Frost, Peter Nodler, William T. Courtney, R. H. Venable.

Ohio State Pharmaceutical Association.—C. W. Tobey, Charles Huston, J. U. Lloyd, T. J. Casper, Otto S. Weusthoff.

New York State Pharmaceutical Association.—Frank F. Knapp, William H. Rogers, Hiram E. Griffith, William Blakie, Julius Jungmann.

Pharmaceutical Association of South Carolina.—A. W. Eckel, C. O. Michaelis, C. F. Panknin, B. F. Moise, E. H. Kellus.

Richmond Pharmaceutical Association.—T. Roberts Baker, Hugh Blair, John B. Purcell, Henry Bodeker, Joseph N. Willis.

King's County Pharmaceutical Society, New York.—E. R. Squibb, L. E. Nicot, Granville M. Baker, George C. Close, William M. Davis.

Literary and Scientific Society of the German Apothecaries of the City of New York.—H. J. Menninger.

Texas Pharmaceutical Association.—John G. Campbell, L. Myers Conner, J. M. Bolie, Joseph Lake, John B. Willis.

Alumni Association Chicago College of Pharmacy.—A. G. Vogeler, Thomas Whitfield, F. M. Goodman.

Alumni Association St. Louis College of Pharmacy.—Frederick F. Reichenbach, Charles Geitner, H. Strassinger.

Alumni Association College of Pharmacy City of New York.—Theobald Frohwein, Thomas F. Main, P. W. Bedford, J. W. Ballard, J. L. Galin.

Alumni Association Cincinnati College of Pharmacy.—A. W. Bain, Theodore Bauge, Charles E. Ferris, E. Goodman, J. H. Feemster.

Alumni Association Philadelphia College of Pharmacy.—Edward C. Jones, William McIntyre, A. W. Miller, George W. Kennedy, Lewis C. Hopp.

Alumni Association of Massachusetts College of Pharmacy.—Thomas Doliber, Lewis Flanagan, Charles P. Orne, Charles A. Tufts, Frank A. Davidson.

Alumni Association of Louisville College of Pharmacy.—John F. Rudell, Oscar A. Beckmann, Otto Mueller.

ALBERT E. EBERT,
T. ROBERTS BAKER,
JOSEPH L. LEMBERGER,
Committee.

On motion the report was accepted, and the delegates admitted. The President extended a hearty welcome to the delegations of those societies not previously represented, and expressed the hope that our next annual meeting would witness a still larger increase.

The Business Committee stated that the credentials of the delegation from the New Jersey Pharmaceutical Association had not yet come to hand, and moved that Mr. Henry P. Thorn, of Medford, New Jersey, be admitted to represent that Association. The motion was adopted.

The Secretary called the roll of members, when seventy-four were found to be present.

The Executive Committee reported the names of fifty-eight candidates who had applied for membership.

A MEMBER.—It is very difficult to hear distinctly the names of all the persons proposed for membership when read, and still more difficult to carry the names in the mind. Would it not be better always to send the applicants to a committee that would look them over and ascertain what their merits are. We are liable, things being done as we now do business, to elect men that we ought not to elect and would not elect if we knew more about them. Such a committee might find in some cases that the applicants are not worthy of a membership here.

MR. EBERLE.—It is my understanding that each application requires to be

indorsed with the names of two members of the Association in good standing, who thus make themselves responsible for the character of the candidate.

MR. KENNEDY.—A special committee would be no more capable of deciding who should be accepted and who should be rejected than the Executive Committee is. It is impossible for any committee to know with certainty who is deserving of membership and who is not. As chairman of the Executive Committee I have found it impossible in many cases to decide with any degree of satisfaction. As a matter of course I have to go by the vouchers. There is an objection made here to one of the candidates proposed, and I have only this to say in reference to that one case, that as the vouchers are two of our best members I could not do otherwise than to report the name.

MR. JARRETT.—Has that rule requiring every applicant for membership to have two members vouch for him ever been enforced?

MR. KENNEDY.—Since I have been on the Executive Committee the name of no candidate has been reported for membership who had no vouchers.

MR. DILL.—I would like to have an answer from the President of this Association, the Executive Committee, or some one else, as to whether a young man who has been engaged in the practice of pharmacy for the period of eighteen months only is a person fit to become a member of this body.

MR. MENNINGER.—I do not know that we have any definite guide or rule that would cover just such a case as that. The Association has a right to take in whoever it sees fit. I think it is possible for a man who has been only eighteen months at the business to be a reputable pharmacist, but that is not the question involved here. I can tell you how it is with registration as pharmacist in Brooklyn: we require that he shall have had eight years of practical experience before we will grant him registration. Most of the State laws require, if not a term of equal length, at least four years' experience, or the passing of an examination before the Pharmacy Board, before there can be any registration, and I for one, if the Executive Committee should recommend for admission to membership in this Association a number of persons at one time, and I knew that amongst them there was one who had been only eighteen months engaged in the business, I should certainly wish to vote separately on that candidate.

MR. DILL.—I should dislike to see this matter create any excitement. The gentleman referred to is a young man engaged in the practice of the profession in our own city, and I will at a convenient time inform the chairman of the Executive Committee who the person is, that the Committee may consider the merits of the objection before the report is finally acted on.

MR. EBERLE.—I see now that the gentleman making the inquiry has a reason for objecting to this particular individual. I have never thought this institution was intended to operate upon special cases, but that it was to be considered upon general principles and in accordance with general rules. I do not think we can by any rule determine that a man cannot be admitted to membership because he has been only eighteen months practicing the profession.

MR. GARDNER.—I move that the sense of this meeting be taken as to

whether a gentleman who has been at the business only eighteen months is capable or incapable of becoming a member.

A MEMBER.—I would like to have it understood who the vouchers are in this instance.

MR. SLOAN.—I am one of the persons who signed this gentleman's application for membership, because I know him well and thought him a proper person. I must say, however, that I think there must be some mistake about his having been only eighteen months in the business. He has been engaged in and about our store in some capacity or other for two or three years. I am quite certain he is a young man of merit, and trying very hard to learn. With these facts in view I felt warranted in signing his application, especially because I understood it to be one of the objects of this Association to take men in and make better pharmacists out of the material that we get.

MR. DILL.—I have nothing in the world against this young man. I only wish to see the dignity of this Association maintained. If the Association wishes to admit him I shall vote for him, but I want the members to vote for his admission with the fact before them that he has had only eighteen months' experience in the business.

THE PRESIDENT.—We have no standard as to the qualifications of applicants for membership, except such as are set out in the constitution.

MR. DILL.—I would like to have some explanation of what we understand by professional standing in our profession.

DR. MENNINGER.—So far as to what constitutes "professional standing," I believe it has been more than once decided heretofore that that is defined by our code of ethics.

THE PERMANENT SECRETARY.—Our Business Committee is slightly in error. We have now no special code of ethics. Eleven years ago it was decided that whatever code there was was contained in the first chapter of the constitution, which gives the aims and objects of the institution.

At the request of Mr. Dill the Secretary read the chapter of the constitution referred to.

MR. JUDGE.—I shall not occupy much time with what I have to say, but shall endeavor to speak to the point in what I do say. What shall constitute a person eligible to become a member of our Association? I believe it is the intention that the gentlemen who compose the American Pharmaceutical Association shall be pharmacists, and it does not seem to me, at this moment, that a very brief probationary course of study or practice should be sufficient to make a man a pharmacist. I have not so been taught; but rather that the gentleman should have gone through a sufficiently extended course of both practical and theoretical pharmacy. When a gentleman has once become a member of this Association he is entitled to receive a certificate, signed by its officers, which will show forth to the public, wherever he may go, that he is entitled to the fellowship of the profession and to the confidence of the public. It does seem to me that if this young man has

been only eighteen months or two years engaged in learning pharmacy, he cannot be the kind of a pharmacist that he should be when he becomes a member of this Association. I do not believe there is a man on this floor who will say that the study or practice of eighteen months can possibly prepare a man to receive the title of a pharmacist, and I think the Executive Committee ought to be very careful to exclude the names of all such persons from their list before making their report recommending applicants for membership.

MR. JARRETT.—What is it that entitles the wholesale dealer to membership in this Association, who probably has no knowledge of pharmacy at all?

THE SECRETARY.—He is a druggist. The constitution makes this an association of pharmacists, and druggists, and teachers of branches collateral to pharmacy.

MR. MILLER.—I suggest that the vote be taken on the other fifty-seven candidates, and the name of the person objected to be excluded from the present vote.

MR. MENNINGER.—And then, Mr. President, I suggest that the President be authorized to cast an affirmative ballot, and that thereupon the fifty-seven candidates be declared elected.

THE SECRETARY.—Mr. President, I object to that method of voting for new members most decidedly. It makes the voting upon membership a matter of form and nothing more.

MR. MENNINGER.—So is it a mere matter of form when you adopt the report of the committee in any case by the dropping of a single affirmative ballot.

THE SECRETARY.—The effect of it would be just this: that fifty persons or more are often embraced in the report of the committee; if, on balloting, there is a single blackball put in to the box, it is evident that there is objection to one of the candidates, and the name may be withdrawn, or a separate vote must be taken for each individual. I think each and every member has a right to give his vote upon the question whether each and every one of the applicants whose names are reported should be admitted.

MR. MENNINGER.—If we ballot for fifty-seven names at once, and if a single blackball, arising from the objection on the part of one member to a single man amongst the fifty-seven candidates is fatal to the ballot, then, as a matter of course, we must ballot for each individual, beginning at the top and going downwards till we find a blackball in the box. It seems to me there is a screw loose somewhere, and that our manner of admitting members should be reformed. Such a manner of electing, it seems to me, must occur to any one as improper.

The chair decided that in accordance with the custom of the Association the admission of the candidates was to be decided

by a secret ballot, and appointed Messrs. Candidus, of Alabama, and Gardner, of New Jersey, tellers. The name of the candidate previously alluded to was withdrawn by the Executive Committee, and a ballot was had on the remaining fifty-seven candidates. On opening the ballot-box the chair announced that three blackballs had been cast. On the statement of the Executive Committee that no objection had been raised against any of the candidates except the one whose name had been withdrawn, it was suggested that the blackballs had probably been deposited by mistake, and in the belief that the name of the candidate objected to was still before the Association; whereupon, the President ordered a second ballot. The ballot having been taken, the President announced that the box contained two blackballs, each accompanied by a slip of paper objecting to the admission of one of the candidates.

Mr. Remington moved that the name of the candidate blackballed be withdrawn without announcing it publicly, and that the remaining fifty-six candidates be declared elected.

Mr. Menninger desired the report, together with the slips of paper, to be referred back to the Executive Committee, for reconsideration. But the question being taken on Mr. Remington's motion, it was carried, and in accordance with it the chair declared the remaining candidates elected.

A motion was made by Mr. Diehl to reconsider the vote by which the fifty-six candidates were declared elected, but did not prevail, there being 17 votes in favor and 46 votes against a reconsideration.

MR. MENNINGER.—I rise to a point of order as well as of law. There has been no ballot cast for these fifty-six men. They have, nevertheless, been declared elected. Our constitution requires that there shall be a ballot, and there has been no such thing, and this Association cannot declare anybody elected but by a ballot. These candidates have not been elected; they have only been declared elected.

THE PRESIDENT.—The Chair sustains the point taken by Dr. Menninger, that there has been no legal ballot taken for the fifty-six persons reported by the Executive Committee.

MR. KENNEDY.—The Executive Committee withdraw, also, the name of the person last objected to, and recommend the election of the following fifty-six candidates:

California.

A. L. Lengfeld, San Francisco.

Illinois.

Alexander C. Bell, Chicago.
Carl Swante N. Hallberg, Chicago.
E. C. Winslow, Danville.

Indiana.

Jacob Baur, Terre Haute.
Albert Byron Buck, Anderson.
David Hilt, Lafayette.
Alfred Hermann Hoffeld, New Albany.
John Albert Lambert, Indianapolis.
James A. Riddell, Aurora.
Henry J. Schloepfer, Evansville.

Iowa.

George A. Ferdinand, Dubuque.
Hermann Nienstædt, Dubuque.

Kentucky.

M. H. Webb, Simpsonville.
Theodore Bell Wood, Lexington.

Louisiana.

F. M. Brooks, Baton Rouge.

Maine.

George C. Frye, Portland.

Maryland.

W. P. Campbell, Cumberland.

Massachusetts.

Bennett Franklin Davenport, M.D., Boston.
George F. Winsmore, Worcester.
Thomas Trefethen Goodale, Boston.
John E. Groff, Boston.
Edgar H. Luce, Boston.
William Herbert Pierce, Boston.
Edwin Walter Shedd, Boston.
William Henry Underhill, Haverhill.
Charles William Wells, Lowell.
Edward S. Wood, M.D., Boston.

Missouri.

James F. Hurt, Columbia.

New Hampshire.

Austin E. Wallace, Nashua.

New York.

Emery Gilbert Bissell, Waterville.
William Blaikie, Utica.
George W. Brooks, Brooklyn.
William P. De Forest, Brooklyn.
Charles H. Gans, Albany.
John R. Gorham, Jr., Newburgh.
Alfred B. Husted, Albany.
C. M. Lyman, Buffalo.
Jason A. Miller, Gloverville.
Henry B. Napier, Owego.
Henry Maurice O'Neill, New York.
Julius Rieffenstahl, Buffalo.
Louis Sautter, Albany.
A. J. Rozezlawski, Navy Yard, New York.
William Wallace Gooker, Sag Harbor.
Reinhold Van der Emde, New York.
Robert Hays Vansant, Astoria.

North Carolina.

Samuel H. Smith, Winston.

Ohio.

Charles Faust, Cincinnati.
George Merrell, Cincinnati.
John A. Nipgen, Chillicothe.
Abner Thorp, Cincinnati.

Pennsylvania.

Alphonso De Lamartine Griffiths, Oil City.
Robert A. Walch, Philadelphia.

South Carolina.

C. P. Aimar, Charleston.

Vermont.

F. W. Pierce, Chester.

MR. REMINGTON.—Now, Mr. President, I move that we take a new ballot, with the same tellers as heretofore, and ballot for these fifty-six candidates to whom no objection is made.

The motion was carried, a ballot was had, and the chair announced the unanimous election of the candidates.

Committee reports being called for the following were handed in :

Report of the Executive Committee, and of the Permanent Secretary.
 Report of the Committee on the Drug Market.
 Report of the Committee on Papers and Queries.
 Report of the Committee on Legislation.
 Report of the Committee on Centennial Fund.
 Report of the Committee on Revision of the Pharmacopœia.

The following Committee on Exhibition was appointed by the chair: Professor H. D. Garrison, of Chicago; Charles C. Spanagel, of Philadelphia; J. B. Dill, of Indianapolis; A. R. Bayley, of Cambridgeport, Massachusetts; and Emil L. Boerner, of Iowa City, Iowa.

The Nominating Committee was appointed as follows, one representative being named by each delegation :

Massachusetts College of Pharmacy,	.	.	.	.	G. F. H. Markoe.
Louisville	"	"	.	.	V. Davis.
Maryland	"	"	.	.	Joseph Roberts.
St. Louis	"	"	.	.	J. M. Good.
Philadelphia	"	"	.	.	C. W. Hancock.
Chicago	"	"	.	.	E. H. Sargent.
Cincinnati	"	"	.	.	T. L. A. Greve.
New York	"	"	.	.	J. Jungmann.
Ontario	"	"	.	.	William Saunders.
Connecticut Pharmaceutical Association,	.	.	.	.	E. A. Gessner.
Georgia	"	"	.	.	John Ingalls.
New Hampshire	"	"	.	.	C. A. Tufts.
Pennsylvania,	"	"	.	.	George Ross.
Kentucky	"	"	.	.	W. H. Averill.
Ohio	"	"	.	.	T. J. Casper.
New York	"	"	.	.	William Blaikie.
South Carolina	"	"	.	.	A. W. Eckel.
Richmond	"	"	.	.	T. R. Baker.
Texas	"	"	.	.	J. G. Campbell.
New Jersey	"	"	.	.	H. P. Thorn.
Society of German Apothecaries of New York,	.	.	.	.	H. J. Menninger.

Alumni Association of Chicago College of Pharmacy,	.	A. G. Vogeler.
" " St. Louis " "	.	F. F. Reichenbach.
" " New York " "	..	T. F. Main.
" " Cincinnati " "	.	J. H. Feemster.
" " Philadelphia " "	.	A. W. Miller.
" " Massachusetts " "	.	F. A. Davidson.
" " Louisville " "	.	O. A. Beckman.

There was no delegate present from the King's County Pharmaceutical Association.

In addition to the above the chair appointed from the Association at large Messrs. C. E. Ferris, of Indiana; F. H. Butler, of Massachusetts; R. W. Gardner, of New Jersey; E. Bocking, of West Virginia; and G. A. Newman, of Kentucky.

The chairman of the Executive Committee read the annual report as follows:

TO THE OFFICERS AND MEMBERS OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.

GENTLEMEN: In accordance with the requirements of the constitution, the Executive Committee would respectfully present their report at this session for your consideration. As you are aware, the twenty-sixth volume of the Proceedings of the Association was not issued till the early part of June. The postponement of the meeting from September to the latter part of November, in consequence of the yellow fever scourge in the South, necessarily interfered with the prompt publication, but still there were other difficulties in the road, which your committee were unable to control, which likewise delayed the publication and prevented an earlier issue. Had your committee not met with unexpected delays, the members would have received the Proceedings some time during February, or four months earlier, even though the meeting was held so late in the year; however, it is hoped that difficulties of the same kind will not hereafter occur.

The last volume is the largest ever issued by the Association, containing about one thousand pages, divided up as follows: the Report on the Progress of Pharmacy, by Professor Diehl, is unusually full and elaborate, occupying 644 pages; reports of several committees, 28 pages; report of the Committee on Revision of the Pharmacopœia, 30 pages, which gives the results obtained by many investigators on fluid extracts, besides other interesting researches. The extended and highly interesting report by Dr. Squibb, on repercolation, covers 47 pages; and the original papers and essays read at the meeting occupy 83 pages; the remaining 168 pages are taken up by the minutes, President's address, discussions, constitution and by-laws, two rolls of members, one appearing for the first time in alphabetical order, and the full address of each member. There are also ninety-nine woodcuts in illustration of drugs, chemicals, apparatus, etc., which were kindly loaned by the publishers of "New Remedies," "American Journal of Pharmacy," and those illustrating Dr. Squibb's paper were cheerfully furnished by him.

The book will be found very serviceable, useful, and convenient for reference, as it contains many new and valuable formulas, besides all the new discoveries related to medicine from all parts of the civilized world. I cannot understand how any pharmacist can get along without it, as not only the last publication, but those preceding it, are so full of useful and scientific matter. I consider the book indispensable, and am of the impression that our membership in a few years could be doubled if members would exert and interest themselves in the right direction. During the past year I have become convinced that by showing the Proceedings to non-members it would have a good effect. We must do something to enlarge our membership; we have been dragging along for a number of years with very little gain; in fact, during the past two years we have been losing. I would therefore suggest that the Association take this matter in hand.

Your Committee has fixed the price of the book, unbound, at \$7, and bound at \$7.50.

As I stated in my last report, the picture of our deceased member, Mr. Ferris Bringham, of Wilmington, Delaware, was published with the Proceedings. The portrait is an excellent one, and a very correct likeness of the deceased; the usual number were printed without any expense to the Association, the father of deceased paying all expenses. Your committee contemplate publishing with the next proceedings the portrait of Eugene L. Massot, of St. Louis, who died in 1871.

REPORT OF MEMBERSHIP.

Number in good standing at last report,	1125
Number elected at last meeting,	56
Number of delegates who became members by signing the constitution,	7
Total new membership,	— 68
Making a total membership of	1188

LOSS IN MEMBERSHIP.

By resignation,	18
Dropped from roll for various causes,	61
By death,	8
Total loss,	— 82
Leaving a balance in good standing at this report of	1106

REPORT OF HONORARY MEMBERS.

Number of members at last report,	24
No new members.	
Loss by death,	1
	— 1
Remaining,	28

Of this number there is but one from the United States, Mr. Daniel B. Smith, of Philadelphia.

A number of applications for membership have been received, with the necessary vouchers attached thereto, and will be reported for election at the proper time.

There is yet the very sad duty to perform of announcing the names of twelve deceased members; some of them we have met more than once at our meetings, others are well known by reputation.

Benjamin Lyman,	.	.	.	Montreal, Canada.
John M. Merrick,	.	.	.	Boston, Massachusetts.
Christopher H. Kolp,	.	.	.	Philadelphia, Pennsylvania.
George B. Wood,	.	.	.	" "
J. T. Foley,	.	.	.	Houston, Texas.
William H. Griswold,	.	.	.	North Adams, Massachusetts.
Frederick V. Heydenreich,	.	.	.	Brooklyn, New York.
Leonce Cherot,	.	.	.	St. Louis, Missouri.
Alfred Preston,	.	.	.	Portland, Maine.
Alfred Ritson,	.	.	.	Columbus, Ohio.
Gotthold Emanuel Bell,	.	.	.	Louisville, Kentucky.
Ferdinand Lingelbach,	.	.	.	" "

BENJAMIN LYMAN, of Montreal, Quebec, Canada, died in Toronto, December 5th, 1878, of inflammation of the lungs, after an illness of only one week. Mr. Lyman was born in Derby, State of Vermont, in 1810, and was consequently in his sixty-ninth year. When quite a young boy he went with his parents to Montreal, where he resided over half a century. His business began and closed in connection with the house of which he was the able head at the time of his death, and which was established by his uncle in 1808. As senior partner of the firm he was the successor of his eldest brother, the late Mr. William Lyman. The deceased was a director of the "Federal Bank of Canada," and was one of the founders of the Mount Royal Cemetery, and President of the company that owns it. He was a man of the kindest and most sympathetic nature, and exceedingly generous in reponse to every call for help to the needy. Being a man of large means, he established several benevolent societies, and contributed largely to their support. He left a wife and four children, two sons and two daughters, besides a host of intimate friends to mourn their loss.

Deceased connected himself with our Association at the meeting held in Boston in 1875.

JOHN MUDGE MERRICK died in February last, in Boston. The deceased, in 1859, graduated from the Lawrence Scientific School at Cambridge. After serving for some time as assistant to Professor Hartford he left the school to take a position in the High School at Natick. He was subsequently elected Principal in the High School at New Bedford; and as he was always enterprising and industrious, he spent his summer vacations, while at New Bedford, as Chemist to the Boston Diatite Company. After leaving New Bedford he accepted the position of Superintendent of this company.

In 1868 he began business in Boston as an analytical and consulting chemist, and had carried on this business up to the time of his death.

In 1874 he was elected Professor of Chemistry in the Massachusetts College of Pharmacy. His contributions to the literature of chemistry have been numerous. Besides many articles in the "American Chemist" and "Chemical News," he was one of the special contributors to Johnston's Encyclopædia. Mr. Merrick was elected a member of this Association at the meeting held in Boston in 1875.

CHRISTOPHER H. KOLP, of Philadelphia, died in his native city February 11th, 1879, of rheumatism, after an illness of three weeks. He was born in Philadelphia, July 27th, 1850, and was therefore in his twenty-ninth year. Deceased was the eldest son of Henry and Catharine Kolp. He obtained an ordinary school education; afterwards he attended the Quaker City Business College, and received its diploma. Having a strong desire to become an apothecary, he entered the wholesale store of William Ellis & Co., Market Street. After remaining a short time with them, in order to have better advantages and more opportunities to improve himself, he began the study of the retail business with Mr. Alfred Tatem, corner Fifteenth and Locust streets, where he remained the balance of his apprenticeship. He graduated at the Philadelphia College of Pharmacy in 1869. He was Secretary of the Zeta Phi Society of his class, and was elected Corresponding Secretary of the Alumni Association of the Philadelphia College of Pharmacy for the years 1874 and '75. He began business for himself in 1870, on North Tenth Street, where, by industry and close attention to business, he was not long in securing the confidence of the people of that locality, and in building up a lucrative business. In 1876 he opened a branch store on Seventeenth Street, which also proved a success, and from there he was called to obey the summons of the messenger of death. In his short but active business life he made many warm friends; he was loved and respected by those best acquainted with him. He united in membership in our Association at the Centennial meeting held in Philadelphia, 1876.

DR. GEORGE B. WOOD, an honorary member of this Association, died in Philadelphia, March 30th, 1879, at the age of eighty-two years. Deceased was born in South Jersey in 1797. Whilst still a lad he was sent by his father to school in New York city, where he remained several years, subsequently finishing his education in the University of Pennsylvania at Philadelphia. In the spring of 1818 he was examined for the degree of Doctor in Medicine, and passed a very creditable examination, his thesis on Dyspepsia receiving particular mention. In 1820 deceased began his career as a lecturer; the lectures were upon chemistry, and were given three times a week. The same year he read his first paper before the Medical Society of Philadelphia. In 1822 he first entered his professional position by occupying the Chair of Chemistry, and afterwards that of Materia Medica in the Philadelphia College of Pharmacy, remaining up to 1835, thirteen years in all. In 1835 Dr. Wood was elected Professor of Materia Medica in the University of Pennsylvania, which position he held up to 1850, when he was transferred to the Chair of Theory and Practice of Medicine, which position he held for ten years. As a teacher Dr. Wood was, as in many other things, precise, clear, logical, and very decided and positive in his opinions. In 1860 deceased re-

signed his professorship in the University of Pennsylvania, and abandoned active professional life. Dr. Wood was widely known as an author, chiefly of medical works; but the one through which he was best known by pharmacists is the United States Dispensatory, which was written in conjunction with the late Dr. Franklin Bache, and of which the first edition appeared in 1838. Deceased became an honorary member of this Association in 1857.

J. T. FOLEY, of Houston, Texas, died there quite suddenly. He was elected a member at our last meeting held in Atlanta, Ga.

DR. WILLIAM H. GRISWOLD, of North Adams, Mass., died there of paralysis, June 1st, 1879, aged fifty-nine years. He was born in New York in 1820, and received a liberal education, and for some years devoted himself to commercial pursuits. The deceased conducted the drug business in the same building for over twenty years in North Adams, accumulating a competency, and was the managing partner in the Wilson Drug House at the time of his death. Constantly occupied by his duties, he was well known by all classes of the community, by whom he was highly esteemed, both for his kindness of heart, his liberality, and his fine social qualities. The distinguishing characteristic of Dr. Griswold was charity; not in that narrow sense that consists in giving where it might redound to his own praise, but of the broader and more catholic nature that not only gave substantial aid to the needy, but was ever ready to cover the faults of his fellows and shield them from reproach; there was no show nor ostentation in his acts of charity.

He leaves a wife, to whom he was most devotedly attached. He was elected a member in 1874, at the meeting held in Louisville, Ky.

FREDERICK VICTOR HEYDENREICH died in Brooklyn, May 4th, 1879. He was born at Wingen, Alsace, then a province of France, March 15th, 1837, and came to this country in 1851. He graduated at the Philadelphia College of Pharmacy in the spring of 1858. He wrote papers in answers to queries on the Diuretic Properties of Cubebs, and on Tincture of Ferric Chloride, at the meeting held in New York in 1867. Mr. Heydenreich was a man of more than ordinary culture and refinement, and of strict integrity. His disposition was so modest and retiring that a person not intimate with him could not appreciate the extent and accuracy of his information on all subjects connected with his profession. His backwardness necessarily prevented him from obtaining the prominence in this Association which he was entitled to.

Deceased leaves a wife and one brother, who is also a member of this Association. He became a member in 1860, at the meeting held in the city of New York.

LEONCE CHEROT, of St. Louis, Missouri, died at Memphis, Tennessee, on the 7th of August, 1879, of yellow fever, at the age of forty years. He was born on the Island of Guadaloupe, West Indies, in 1839, emigrated to this country with his parents in 1849, and settled in St. Louis; began the study of pharmacy in 1861. In 1862 he was in the employ of Mr. William H. Crawford, who speaks very highly of him in every respect. In 1868 he went to Memphis, and after remaining there till 1867 he went to Green Bay, Wisconsin, and resided there till 1877, returned to St. Louis, and in November, 1878, located for the second time in Memphis, where he remained up to the time of his death. Deceased was married, and leaves a wife and two small children. He became a member of this Association at Boston in 1865.

MR. ALFRED PRESTON, of Portland, Maine, died there quite recently. I have not obtained the desired biographical notes.

ALFRED RITSON, of Columbus, Ohio, died there quite suddenly. He was born in Liverpool, England, May 17th, 1826, and was therefore in his fifty-third year. He emigrated to this country in 1851, and spent nearly all of his time in Columbus. Shortly after his arrival here he was appointed druggist at the Insane Asylum, where he remained several years. He next entered a drug store as clerk, and subsequently went into partnership with the proprietor, Mr Marple, and finally bought Mr. Marple's interest in the year 1870. He continued in business at the same place till about two years before his death, when he removed to the stand where the store is now located. He was considered and recognized as being among the most skilful in the profession in Columbus. He began the drug business in 1841, in his native country. He was a graduate of the Maryland College of Pharmacy, and became a member of our Association at the Baltimore meeting in 1870.

GOTTHOLD EMANUEL BELL, of Louisville, Ky., died there April 9th, 1879, aged twenty-nine years and nine months. Mr. Bell was born in the Grand Duchy of Baden, July 26th, 1849, and with his parents arrived at a very early age in the United States; his father, a noted veterinary surgeon, locating in Louisville, Ky. The deceased was educated in the public schools in Louisville, and after completing the usual course he began the study of pharmacy with Professor Scheffer, remaining in his employ eight years. In 1878 he opened a store on his own account, and for several years did a very prosperous business; but, owing to ill health, he met with business reverses, and was compelled to dispose of his store a short time preceding his death. He died, leaving a wife, infant daughter, and an aged mother to mourn his early death. Deceased became a member of the Association at the meeting held in Louisville in 1874.

FERDINAND LINGELBACH was born at Cassel, Germany, September 1st, 1845. When at the age of seven years he lost his father, a veterinary surgeon, and when fourteen years old he came to this country, and learned the drug business with Mr. A. Fennel, of Cincinnati, with whom he remained until 1864, when he formed a partnership with Mr. William Mann. In 1866 he went to Louisville, and remained in charge of Mr. William G. Schmidt's retail store until, in 1871, he purchased the store on Broadway, near Ninth Street. He was seized with apoplexy on the night of August 26th, 1879, and remained unconscious until the next morning, when he died. The deceased leaves a wife and a son, four years old, to mourn their loss. His business tact and energy, his amiable character and charitable disposition made him hosts of friends. He was one of the founders and a staunch supporter of the Louisville College of Pharmacy, and was a member of the American Pharmaceutical Association since 1874.

In concluding my report allow me to return my heartfelt thanks to those officers and members who rendered me such valuable assistance when called upon.

GEORGE W. KENNEDY,
Chairman Executive Committee.

POTTSVILLE, PA., September 5th, 1879.

On motion of the Business Committee the report was referred to the same committee (Messrs. Joseph Roberts, E. H. Sargent, and C. F. Hildreth) having the President's address under consideration.

Mr. Sargent moved the following:

Resolved, That a committee of three be appointed to report at our next session what change may be desirable in our by-laws to make definite and uniform the manner of balloting for members; and also to report on the requisite qualification of candidates for membership in this Association.

The resolution was adopted, and the chair appointed Professor Remington, Mr. J. U. Lloyd, and Professor Judge said committee.

The Association then adjourned until 9 o'clock on Wednesday morning.

Second Session.—Wednesday Morning, September 10th.

At the appointed time, President Luhn called the meeting to order. The minutes of the first session were read by the Secretary, and, on motion, approved.

Mr. T. Roberts Baker, chairman of the Nominating Committee, presented the following nominations for officers and standing committees to serve during the ensuing year:

President.

GEORGE W. SLOAN, Indianapolis, Ind.

First Vice-President.

T. ROBERTS BAKER, Richmond, Va.

Second Vice-President.

JOSEPH L. LEMBERGER, Lebanon, Pa.

Third Vice-President.

PHILIP C. CANDIDUS, Mobile, Ala.

Treasurer.

CHARLES A. TUFTS, Dover, N. H.

Permanent Secretary.

JOHN M. MAISCH, Philadelphia, Pa.

Reporter on the Progress of Pharmacy.

C. LEWIS DIEHL, Louisville, Ky.

Executive Committee.

GEORGE W. KENNEDY (Chairman), Pottsville, Pa.
 ADOLPH W. MILLER, Philadelphia, Pa.
 WILLIAM SILVER THOMPSON, Baltimore, Md.
 THOMAS J. CASPER, Springfield, Ohio.
 JOHN M. MAISCH, *ex-officio*, Philadelphia, Pa.

Committee on the Drug Market.

LOUIS LEHN (Chairman), New York.
 HENRY W. FULLER, Chicago, Ill.
 SOLOMON CARTER, Boston, Mass.
 BENJAMIN F. MOISE, Charleston, S. C.
 JAMES G. STEELE, San Francisco, Cal.

Committee on Papers and Queries.

J. U. LLOYD (Chairman), Cincinnati, Ohio.
 ROBERT H. COWDREY, Chicago, Ill.
 CHARLES MOHR, Mobile, Ala.

Business Committee.

H. J. MENNINGER (Chairman), Brooklyn, N. Y.
 ELI LILLY, Indianapolis, Ind.
 CHARLES L. EBERLE, Philadelphia, Pa.

Committee on Prize Essays.

C. LEWIS DIEHL (Chairman), Louisville, Ky.
 JOHN F. JUDGE, Cincinnati, Ohio.
 EMIL SCHEFFER, Louisville, Ky.

Committee on Legislation.

JOHN M. MAISCH (Chairman), Philadelphia, Pa.
 JESSE W. RANKIN, Atlanta, Geo.
 SAMUEL A. D. SHEPPARD, Boston, Mass.

On motion the report was received, and the Association proceeded to ballot for President for the ensuing year. Messrs. Eberle, of Pennsylvania, and Griffith, of New York, having been appointed tellers, reported Mr. Sloan duly elected.

Mr. Main moved that the Secretary be directed to cast an affirmative ballot in favor of the remaining officers and committees

nominated. The motion was adopted, and the tellers reported the election of all nominees.

The chair appointed Messrs. Gordon, of Ohio, and Ross, of Pennsylvania, a committee to conduct the President elect to the chair. Mr. Sloan was escorted to the platform, and the Association rising, was introduced by the retiring President as follows:

GENTLEMEN: I beg leave to introduce to you Mr. George W. Sloan, of Indianapolis, your new President, a gentleman whom you all know, and who will fill the position with ability and with honor to himself and the State he represents. Retiring from the position of President of your Association, as I now do, allow me to thank you for the forbearance you have kindly shown with my faults. In placing me in the position as your presiding officer, you must remember that it was your own action, and if I have failed in your expectations I have the consciousness of feeling that I have done my duty to the best of my ability.

On taking the chair the President elect addressed the Association as follows:

GENTLEMEN OF THE AMERICAN PHARMACEUTICAL ASSOCIATION: I thank you for the honor conferred upon me, and the compliment you have paid to our State in selecting one of her citizens as your presiding officer. I sincerely thank you for the unexpected honor, and trust you will give me your forbearance and patience in my endeavors to discharge faithfully and impartially the duties of the position in which you have placed me. I hope and trust that the seeds sown in this, your first visit as a body to our State, may germinate and fructify, so that when our Secretary calls his roll of delegates at our next annual meeting, there may be included in it one from the Indiana Pharmaceutical Association. I trust, gentlemen, that peace and harmony will continue to prevail during the sessions of this meeting, and that its social feature may continue to grow, and the many pleasant and lasting friendships that have heretofore been formed may continue. Again thanking you for the unmerited honor conferred on me, I will not detain you further from the business of the hour any longer than to introduce to you those gentlemen whom you have chosen to assist me in the discharge of my office. And I now have the pleasure of presenting to you Mr. T. Roberts Baker, of Virginia, First Vice-President for the ensuing year.

Mr. Baker stepped forward and said:

MR. PRESIDENT: According to my understanding, while they are expected to be more or less ornamental, the Vice-Presidents are not expected to make long speeches, if, indeed, to make any at all. But, sir, I would be false to the instincts of my own heart if I failed to say that I appreciate the honor that has just been conferred upon me. And, gentlemen of the Association, although it is a sinecure, still I feel that it is an honor, and thank you for the compliment.

The President then introduced Mr. Joseph L. Lemberger, of Pennsylvania, Second Vice-President elect, who said:

MR. PRESIDENT: In the humble position of Second Vice-President, it is a little unexpected that I should be called upon to say anything at all. The Third Vice-President and I have a great man ahead of us, and while the First Vice-President may possibly have some chance to assist the President in the discharge of his duties, we two can hardly expect to get near enough to see the President at all (laughter). I must say to you, however, that I heartily thank you for this mark of respect. I do not know that I can say anything more; I certainly could not say less.

The Third Vice-President, Philip C. Candidus, of Alabama, was then presented, and, with a sally of wit that put the meeting into a high good-humor, avoided making a speech.

The Permanent Secretary read his annual report, as follows:

REPORT OF THE PERMANENT SECRETARY.

TO THE CHAIRMAN OF THE EXECUTIVE COMMITTEE:

In the prefatory notice to the last volume, the Secretary has already stated one of the causes resulting in a delay of the publication of the volume. The Report on the Progress of Pharmacy, which for some years past has been printed at the head of the volume, was in the Secretary's hands in September, and after having obtained the consent of the Executive Committee and the President, arrangements were made for printing this voluminous report before the twenty-sixth annual meeting took place, so that after the meeting only the committee reports, essays, and minutes might be left to complete the volume, which it was hoped should be in the hands of the members in January or February. However, in regard to a portion of the cuts necessary for illustrating the Report on the Progress of Pharmacy, an unforeseen difficulty arose, which was not adjusted until the end of December, and in the beginning of January the manuscript could be placed into the printer's hands. In somewhat less than six months from this time, the volume, covering 1000 pages, was printed, bound, and sent to those entitled by mail or express. Although this is by no means an unusual time for passing a book of this size through the press, still the Secretary had hoped to finish this part of his labors about six weeks or two months sooner; the delay is due to causes beyond the control of the Secretary or Executive Committee.

The Secretary is pleased to state that of the large number of woodcuts which the Reporter on the Progress of Pharmacy considered desirable for illustrating his comprehensive report, only a comparatively small number had to be prepared at the expense of the Association, while the large majority was courteously loaned without any expense, namely: 48 cuts by the publishers of "New Remedies," and 26 cuts by the publishers of "The American Journal of Pharmacy." Acknowledgments are also due to the relatives of our

late fellow-member, Ferris Bringham, who obligingly furnished the likeness of the latter for last year's Proceedings, without any cost to the Association. It should also be mentioned here, that the cuts illustrating the essay on "Fluid Extracts by Repercolation," were gratuitously furnished by our fellow-member, Dr. E. R. Squibb.

The expenses of publication of the twenty-sixth volume of Proceedings were as follows :

Phonographic Report,	\$50 00
Woodcuts,	62 00
Composition, Paper, and Printing,	1950 53
Binding,	310 58
Journals for use of Reporter on the Progress of Pharmacy,	66 85
Salaries of Reporter and Secretary,	1100 00
Incidental (exclusive of travelling) expenses of Secretary,	283 96
Total,	<u>\$3823 42</u>

This sum does not include the salary and incidental expenses of the Treasurer. The Secretary's incidental expenses were as follows :

Telegrams,	50
Packing-boxes, etc.,	\$11 26
Freight and expressage,	101 95
Postage stamps,	121 50
Circulars and blank forms,	21 50
Journals for Reporter not otherwise accounted for,	27 80
Total,	<u>\$283 96</u>

The last item includes already the subscriptions for two journals for the coming year, which were remitted to Europe with the subscriptions for the current year. The items of freight, expressage, and postage stamps amounted, as given above, to \$223.45, and during the two preceding years to \$222.15 and \$239.62 respectively. The Treasurer's report for the present year will contain a charge of \$37.56 expenses of the Secretary, which were already contained in the report of the latter made last year.

As usual, the Proceedings have been delivered to all members who were reported by the Treasurer as not being in arrears, and to all those of whose payment of arrearages the Secretary has since been informed. Quite a number of members have neglected to pay their annual contributions. For some years past it has been the policy of the Executive Committee to print only a sufficient number of the Proceedings, barely exceeding those required for the members on the roll, for the exchanges, and for the complimentary copies annually sent out. The Proceedings on hand, and stored in the building of the Philadelphia College of Pharmacy, are as follows :

1851. 313 in paper.	1866. 71 in paper,	80 bound.
1852. 91 "	1867. 152 "	87 "
1853. 91 "	1868. 60 "	150 "
1854. 62 "	1869. 104 "	144 "
1855. 105 "	1870. 112 "	73 "
1857. 253 " 17 bound.	1871. 99 "	59 "
1858. 58 " 10 " 130 loose.	1872. 108 "	4 "
1859. — " 44 "	1873. 22 "	88 "
1860. — " 207 "	1874. 132 "	25 "
1862. — " 282 "	1875. 68 "	39 "
1863. — " 262 "	1876. 47 "	40 "
1864. 180 " 115 "	1877. 53 "	78 "
1865. 154 " 26 "	1878. 63 "	153 "

The insurance on the above and other books of the Association is continued in the sum of \$2500, at an annual premium of \$15, in the German Fire Insurance Company of Philadelphia.

The resolution passed by the Association at the preceding meeting, requiring the delegations to furnish the Secretary with the names and addresses of the president and secretary of the society they represent, with the view of publishing them in the Proceedings, has been complied with to a very limited extent only. In response to the Secretary's circular a few societies have furnished the information. It is again urged upon the delegates present that they comply with the request of the Association.

The Secretary's attention has been called to an incorrectness in the Treasurer's statement for last year as printed in the Proceedings (for 1878). Item No. 25 of the disbursements contains a typographical error, \$800 should be \$500. The incorrectness in the statement of receipts, and the difference of 20 cents in the balance as reported by the Treasurer and by Auditing Committee, will be explained by the former officer in his report.

The Secretary asks the indulgence of the Executive Committee and of the Association for again referring in this place to the financial affairs, which in his opinion should be so arranged now as not to be shaken even by unforeseen circumstances. In 1867 the annual contribution of members was raised from \$2 to \$3, and in 1870 it became necessary to increase the dues to \$5 a year. Up to that time the total expenses of the Association never exceeded \$3000 a year; but for the year 1871-1872 they rose to over \$4000; in 1873 they were \$3116; in 1874, \$3985; in 1875, \$4516; in 1876, \$4979; in 1877, \$5560; and in 1878, \$4451. The total expenses for the year closing with the beginning of the present meeting are not known to the Secretary at the time of writing this report. It will be observed, however, that the expenses have very rapidly increased, so that they are proportionately higher now, with the annual dues at \$5, than they had been when the dues were \$3 a year; but if the number of members be taken into consideration, we will find that the annual expenses, evenly divided among the members, amounted in 1870 to \$3.50, and at the present time to about \$5. The Secretary is not favorably impressed with an increase of the annual dues; and while he believes that the adoption of the

suggestion of the Committee on Ways and Means, that a per capita tax *may* be levied for covering estimated deficiencies. may be, very appropriately, included in our by-laws, yet he believes that it will be for the best interests of the Association if that power be never exercised, or only in very urgent cases. It seems to be by far better policy that the expenses of the Association should be reduced as much as possible; that an effort be made to prevent the dropping off of members; that the members be urged to increase the usefulness of the Association by a further increase of membership; and that a permanent fund be gradually created, the interest of which only should be used for partly defraying the current expenses.

The subject has now engaged the attention of the Association again since 1877, and it is to be hoped that the members have endeavored to familiarize themselves with it in all its bearings. The Secretary will now merely call attention to a few points in this connection. Since 1865, to and including the meeting of 1877, the Association has been fortunate enough to have secured the services of Mr. James H. Slade, of Boston, as phonographic reporter. A year ago his professional engagements called him to the Pacific Coast, and the Secretary has not heard from him to the present time. At Atlanta, as well as at the present meeting, the services of a competent reporter, resident of the respective cities, has been engaged; and since, by continuing this arrangement in the future, the Association will save the travelling expenses and compensation for loss of time of a permanently engaged reporter, it is suggested that hereafter, whenever possible, a stenographer be engaged residing at or near the place of meeting. The great advantage of having a permanent stenographer is to be found in his becoming familiar with the members, the mode of conducting the business, and with the subjects discussed before the Association. By changing this reporter annually the labors of the Recording Secretary will be materially greater than under the previous arrangement, but the course suggested will result in a considerable saving to the Association.

By chap. v of art. ii of the by-laws it is made the duty of the Permanent Secretary to *preserve* all journals and volumes, after they have been received from the Reporter, on the Progress of Pharmacy. After consulting with some of the members who were instrumental in having this by-law adopted, it was decided that the journals, etc., be bound from time to time. In the course of several years a considerable number of volumes have thus accumulated, nearly all of which have been used for the compilation of the Reports on the Progress of Pharmacy. The Association being of a migratory character it can scarcely be its purpose to establish a library consisting mostly of journals, and it is, therefore, suggested that the Permanent Secretary be authorized, under the direction of the Executive Committee, to dispose of such journals and books which are of no further use to the Association. It is by no means contemplated to get rid of all serials, but chiefly of those which have been acquired by purchase. A number of the exchanges received by the Association are of lasting value, and may very properly be preserved; the selection may safely be left to the Executive Committee. Many of the journals may probably be disposed of to libraries or individuals; but even if such should not be the case, the saving in the cost of binding, added to the saving from

engaging a local stenographer, would amount to about two hundred and fifty dollars a year, more or less.

If we examine the lists of members dropped from the roll it will be observed that by far the great majority of them reside in places for which "authorized agents" have not been appointed under the resolution passed at the eighteenth annual meeting (see Proceedings, 1870, pp. 108 and 114). The cause of their falling off seems to be a plain one. Members receiving their bills by mail directly from the Treasurer, often lay it aside for the present, and ultimately forget it; the second year comes around, the amount is doubled, the bill again laid aside for a more convenient time, until in another year the amount has become inconveniently large, and the member is liable to be dropped. On the other hand, the authorized agent presents the bill either in person or through one of his employés, or through a collector, and if, for urgent reasons, not paid on the first call, goes to the trouble of calling a second or even third time, until the collection is made. It is in this way that, in the larger cities, the membership has been maintained so well, and it is due, in a great measure, to the efficient aid of these authorized agents that the dues have come in promptly from a large number of members. The Association is indebted to a great extent to the authorized agents for maintaining the membership in the large cities, and the members residing in these places owe to them, in a great measure, the retaining of their good standing in the Association, without having to go to the trouble of directing a letter to the Treasurer, or expending a three cent postage stamp for the purpose. If this view be correct,—and it is believed that an examination of the lists of members dropped will prove it to be so,—it is suggested that the President for the ensuing year appoint an authorized agent for every city and town where three or more members reside. The power to do so is ample under the resolution passed in 1870, and an important feature would be that the labors of the Treasurer would become lighter thereby.

Another advantage would incidentally result to the Association from an increase of membership through the authorized agents, many of whom have been the means of showing to non-members the advantage of becoming a member. A sufficient increase of membership would at once remove all financial embarrassment. If the membership was doubled the receipts would naturally be at least doubled, while the increase of expenses for printing and distribution of Proceedings would not exceed twenty per cent. of the present disbursement. In the course of two or three years the collections would pay the expenses for the same year, even with a reduction of the dues from five to three dollars; always provided that the membership be maintained, and that the Association would not authorize additional expenditures.

To accomplish a reduction of the dues in the future the creation of a permanent fund, it is believed, will be a most valuable auxiliary. Up to the present time not only the annual dues, but likewise the admission fees and the receipts from the certificates of membership, have been annually absorbed, and still the Association had to pay part of last year's debts with the income of the present year. There is no reason why, if not at present, at least in

the near future, the admission fees should not be added to the permanent fund. Such a suggestion was made several years ago, but never acted on; perhaps it was premature then; but now, when the whole financial system of the Association's affairs is to be subjected to close scrutiny, that matter may likewise be kept in view, in which case article iv of the constitution would need a verbal modification.

From what has been said it may be readily gleaned that the Secretary is, on the whole, favorable to the amendments proposed by the Committee on Ways and Means. He is well aware that if a large number of members should at once become life members, in accordance with this proposition, the available funds for use would be materially decreased; but he has also sufficient confidence (1) in the great majority of the life members under the old constitution, who have ceased to pay annual dues, that they would become life members under these modified rules; and (2) in the members generally, that they would do their best to see the Association safely through a few years, until the accumulation of the permanent fund, and an increased membership, would enable the Association to draw for the current year's expenses only on the receipts for the current year, and, if possible, to reduce the annual dues to a lower figure than at present.

All of which is respectfully submitted.

JOHN M. MAISCH,
Permanent Secretary.

On motion of Mr. Eberle the report was accepted and referred to a committee of three; the chair appointing Messrs. Roberts, of Maryland; Sargent, of Illinois, and Eberle, of Pennsylvania.

The Treasurer read the following annual report:

TO THE OFFICERS AND MEMBERS OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.

GENTLEMEN: In conformity with the requirements of the constitution, I herewith present a report of the transactions of this office for the past year. All the bills of which I have any knowledge have been paid, and there is a balance in the treasury of nine hundred and eighty-one dollars and ninety-eight cents. This does not include the Ebert Fund, and the amount for a life membership, which is invested; only the interest of this investment is used.

This balance is larger than I feared I should be able to report. At some of our meetings we have had a large increase of members; the number elected at our last meeting was a few more than half the number who have joined us in some previous years. Our expenses have been less than for any year of the past five, but we suffer from the procrastination of a large number of members in paying their dues. The bills were sent out promptly to each member, but from a large number there has, as yet, been no response. At an early date

after the close of this meeting it will be the duty of the Treasurer to kindly remind these delinquents of this matter.

The Proceedings, by your vote, are withheld from all in arrears, and we have noticed that those who do not receive the Proceedings for one or more years rarely after that time remit their dues, and are dropped from the roll of members. A failure to keep informed of what the Association is doing, or what is being accomplished elsewhere for pharmacy, causes them to lose their interest in the Association.

We have on our roll eleven hundred and twenty-five members; of this number sixty-five are life members under the old arrangement; and I have received notice of ten resignations, and one death, since the publication of the Proceedings, leaving at this time ten hundred and forty-nine contributing members. Several members, who did not resign their life membership, have always paid their contributions, and within the past year two members who were on the life member list have requested their names placed on the contributing list.

The promise to return certificates when ceasing to be a member, is entirely overlooked. I have not received a single certificate during the past year. We had thirteen resignations during the past year, and sixty-one names were dropped from the rolls for non-payment of dues. Unless their dues are paid before the publication of the Proceedings, a large number will be dropped from the rolls.

I would again renew a request I have before made: when members change their residence they would confer a favor upon the Secretary and Treasurer by informing one or both of the same as soon as again permanently located. More or less letters are returned each week from the post-office with "Unknown" marked upon them. Attention to this matter will save labor to us, and expense to the Association.

I regret that in copying my report for the printer last year two errors occurred. The amount received for certificates was omitted, and the salary of the Treasurer was printed \$800, instead of \$500. The correct report should have been printed as follows:

Balance on hand as per last report,	\$954 39
Amount received from contributions,	4090 00
" " " the sale of certificates,	110 00
" " " the sale of Proceedings,	79 10
" " " Ebert Fund,	30 00
" " " George J. Carney,	50 00
	<hr/>
	\$5818 49

The errors were clerical, and did not change the balance reported by me, and approved by the Auditing Committee.

With sincere thanks to the several agents of the Association for their valuable assistance, and to the members with whom I have had such pleasant intercourse during the past year, I respectfully present this report.

780 MINUTES OF THE TWENTY-SEVENTH ANNUAL MEETING

Statement of the Receipts and Disbursements of the American Pharmaceutical Association for the year ending September 9th, 1879.

1879.		RECEIPTS.	
Sept. 9.	To balance on hand as per last report,		\$862 31
	Amount received for yearly contributions previous to 1879,		2730 00
	Amount received for contributions for 1879,		1577 50
	For memberships,		260 00
	From the sale of certificates,		152 50
	From the sale of Proceedings,		63 05
	From the Ebert Fund,		66 07
			<hr/>
			\$5711 48
1879.		DISBURSEMENTS.	
Sept. 9.	By cash paid for expenses of the Proceedings,		
	Sherman & Co., printing,	\$1950 58	
	William Rutter & Co., binding,	810 58	
	William H. Clark, wood engraving,	62 00	
	John H. Graham, phonographic report,	50 00	
	Ig. Kohler & Co., journals for the report of the Progress of Pharmacy,	66 85	
	C. Lewis Diehl, salary as reporter on the Progress of Pharmacy,	500 00	
		<hr/>	\$2939 46
	Paid for certificates American Bank Note Co.,		58 50
	Paid for expenses, John M. Maisch, salary, .	600 00	
	Miscellaneous expenses, including expenses attending the meeting at Atlanta, printing, stationery, freight, expressage, packing-boxes, postage, and engrossing resolutions on the death of Thomas H. Power, .	404 52	
	Charles A. Tufts, salary,	500 00	
	Miscellaneous expenses, including expenses attending the meeting at Atlanta, printing, stationery, expressage, postage, filling out certificates, expenses of agents in cities, .	202 97	
		<hr/>	1707 49
	Charles Rice, expenses of the Pharmaceutical Committee,		10 00
	Insurance on the property of the American Pharmaceutical Association, held in the Philadelphia College of Pharmacy, . . .		15 00
			<hr/>
			\$4730 45
	Balance to new account,		980 98
			<hr/>
			\$5711 48

CHARLES A. TUFTS,
Treasurer.

DR. MENNINGER.—In rising to move the acceptance of the Treasurer's report I feel bound to express the hope that some method be devised of keeping the records connected with the Treasurer's department, and the reports which he makes to us every year, in such a manner that the Association may be able to arrive at the amounts of its receipts and expenditures for each single year. I do not wish to be understood as criticising the Treasurer for making a report of this kind; for he has done simply what those did who have gone before him; it has always been done in that way. The Treasurer receives every year more or less money on back accounts,—money that does not belong to the receipts of the current year at all. The same must be true, to a greater or less extent, of disbursements. The report says "so much from contributions," and so forth, but does not say whether it is all for the current year or not. We should be able to ascertain by a glance at the Treasurer's report just how much money was received last year on current account, and just how much on back account. A business man would never think of attempting to find out how much he has gained or lost in a year by simply subtracting the expenses from the receipts, without knowing just how much of his receipts were from old debts that had accrued from former years. We have that very thing here to day. This balance in our favor is fallacious. To make this favorable showing we have mortgaged our receipts for the year commencing with this meeting. The truth is that we are financially very much embarrassed. I am in favor of the appointment of a special committee to whom shall be referred the reports of the Secretary and Treasurer, with a view to the discovery of some plan by which our finances can be better represented to the Association. And while I say this let me also say that I have the greatest respect for the ability and responsibility of both of these officers. I desire to cast no reflection whatever upon either of them, but I do denounce the system in which our financial matters have been kept upon the books. I do not say it is anybody's fault; I say it is the fault of our organic law. I say, further, that in moving for this committee I do not desire in any manner to impinge upon the province of the Auditing Committee.*

Mr. Saunders moved that the report of the Treasurer be accepted and referred to an auditing committee, which motion prevailed.

MR. EBERLE.—It seems to me that the referring of the report of the Treasurer to an auditing committee does not cover all that Dr. Menninger included in his remarks. It is simply to test the accuracy and correctness of the accounts. Beyond that it seems to me that what the Business Committee wants is a change in the manner of keeping our books. It would be more satisfactory if we could have a committee that would get up and present to us a report on the other matters suggested by Dr. Menninger. If the same committee should take the Treasurer's report along with that of the Secretary and combine the results of a care-

* In the Treasurer's statement, as printed above, the suggestions made by the chairman of the Business Committee have been carried out.—EDITOR.

ful examination of them both, and present them to the Association with such suggestions as the committee should see fit to make, the Association might discuss those suggestions without interfering with the arrangements or the work of any other committee.

DR. MENNINGER.—I did not want precisely a change in our form of book-keeping. There are other questions that enter into my idea of what ought to be done. The reduction of expenses is one most important part of financial reform, and there are more ways than one of curtailing our expenses.

MR. REMINGTON.—Would it not simplify matters to request this committee, which I understand is now forming, to let it consider both the report of the Secretary and of the Treasurer? If this committee was enlarged by the addition to it of the Secretary, Treasurer, and chairman of the Executive Committee, I think it would be able to take hold of the matter and simplify it very greatly. Let that committee take into view the suggestions of the Treasurer in regard to improving the finances. It would not at all interfere with the duties of the Auditing Committee. I make a motion that such a committee be now appointed, and that they be instructed to report to-morrow afternoon.

The motion was seconded and prevailed.

The chair appointed as such committee, Messrs. Joseph Roberts, of Maryland; E. H. Sargent, of Illinois; and Charles L. Eberle, of Pennsylvania. And as the Auditing Committee. Messrs. John Ingalls, of Georgia; Charles Heinitsh, of Pennsylvania; and John Buck, of Illinois.

The Secretary read Mr. Wickham's Report on the Drug Market, and a synopsis of Mr. Steele's Report on the California Drug Market, both of which were accepted and referred. (See pp. 549, 562.)

Professor Diehl moved that a special committee of three be appointed, whose duty it shall be to assist the Committee on the Centennial Fund, at the present meeting, in collecting as much as possible of the balance not yet paid up. The motion prevailed, and Professors Bedford, of New York; Good, of St. Louis, and Diehl, of Louisville, were appointed said committee.

At the suggestion of the President, Mr. Kennedy, chairman of the committee, made a statement for the information of the members of the Association in relation to the Centennial Fund, as follows:

At the Centennial meeting of 1876 the pharmacists and druggists of Philadelphia and vicinity raised a large sum of money for the purpose of entertaining the visitors, and found afterwards that they had the sum of five hundred and twenty-five dollars left. That sum was donated to the American Pharmaceutical Association for a specific purpose, upon the condition that

the Association should within one year raise a like amount for the same object, that object being to defray the expenses of scientific investigations and experiments. Experimenting on a somewhat large scale costs money, and many of the drugs, the investigation of which is desirable, are rather expensive. It is highly important that we should raise the sum required of us as soon as possible, in order to secure the donation. The amount that is yet to be raised is between \$325 and \$350. I received from various sources for this fund, during the years 1877 and 1878, the sum of \$160, and since then I have received some \$25 or \$30, leaving somewhere from \$325 to \$350 yet to raise.

Professor Markoe moved the following amendment to the by-laws :

Resolved, That section 4, article iii, chapter viii, which reads, " The officers elected shall take their respective places " (at the second session), be stricken out, and the following section added to article iv : " The officers elected shall take their respective places at the opening of the last session."

Under the rules the proposition lies over to a subsequent session.

Professor Markoe moved the appointment, from the members present, of an official reader, for the purpose of reading such papers and reports as are now read by their authors. The motion was adopted, and Professor Remington was appointed by the chair to fill this office.

Professor Diehl read the introductory part to his Report on the Progress of Pharmacy for the past year, which was accepted, and ordered to be published.

The Committee on Revision of the By-laws, referring to the election of members, presented the following report, which was read by Professor Remington :

Your committee respectfully recommend the following alterations in our by-laws :

First. To change article ii of chapter vi, so that it will read as follows :

CHAPTER VI.

Of Committees.

ARTICLE II.—SECTION 1. The Executive Committee, of which the Permanent Secretary shall be a member, shall have charge of the revision of the roll and the publication of the Proceedings.

SEC. 2. The chairman of this committee shall read at one session the names of those candidates for membership which have been approved by them, and

the applicants shall be balloted for at the next session by the members present, when a vote of two-thirds shall be sufficient to elect them.

SEC. 3. The Executive Committee shall also hear and decide upon any objections which may be presented to them, referring to the fitness of the candidates for membership; and no names shall be balloted for without first receiving the approval of this committee.

Strike out the last paragraph of article ii, chapter vii, which reads, "If, after investigating his claims, they shall approve his election, they shall, at the earliest time practicable, report his name to the Association, and he may be elected by two-thirds of the members present on ballot."

Instead of section 5, article ii, chapter viii, insert: "The Executive Committee shall read the names of the candidates for membership, as provided in section 2, article ii, chapter vi "

Whilst preparing this report your committee were forcibly impressed with the necessity which they believe has arrived for a radical change in our by-laws, whereby such matters as that herein considered, and others, could be settled by a business council appointed by the Association, who would be charged with the duty of attending to all matters of a business character, and thus relieve the Association, so that the time of the Association could be occupied almost entirely in the reading and discussion of papers and queries of a scientific and practical character; and we suggest the appointment of a committee to bring forward a suitable plan to effect this object, and to report at our next meeting.

JOSEPH P. REMINGTON,
J. F. JUDGE,
J. U. LLOYD,

Committee.

The report was accepted, and laid over for consideration at a subsequent session.

The Secretary read a communication signed by numerous citizens and business men of Kansas City, Mo., inviting the Association to hold its next annual meeting in that city.

Professor Bedford read a similar invitation from Saratoga Springs, N. Y., and advocated the selection of the latter place for the next meeting.

On motion both invitations were referred to a committee of three on the time and place of the next annual meeting, said committee to be appointed by the chair.

The Association then proceeded in a body to the exhibition room, and, under the guidance of the Committee on Exhibition, examined the specimens, many of which were of unusual interest. Subsequently an adjournment was had until 3 o'clock, P.M.

Third Session.—Wednesday Afternoon, September 10th.

At the appointed hour President Sloan called the meeting to order. The minutes of the second session were read by the Secretary, and on motion approved.

The chair appointed Messrs. Vincent Davis, of Kentucky; W. H. Crawford, of Missouri, and H. E. Griffith, of New York, the Committee on Time and Place of the Next Annual Meeting.

The Business Committee stated that the special order of business, referred to the present session from the twenty-sixth annual meeting, was the consideration of the report of the Committee on Ways and Means, which involved some changes in the by-laws; but since the committee on the Secretary's and Treasurer's reports had the same subject, namely, the finances of the Association, under consideration, it would be best to defer discussion for the present, until the last-named committee could report. It was accordingly moved that the special order for this hour be postponed, and that the reports of the Committee on Ways and Means and of the Committee on the Secretary's and Treasurer's Reports be made the special order for Thursday afternoon.

The motion was adopted.

The report of the Committee on Prize Essays being called for, Professor Diehl stated that one of the members of the committee, Professor Scheffer, had been on a visit to Europe, and that on this account, and because of the delay in the publication of the Proceedings, the Committee had not been able to confer together. On motion, further time was granted for the preparation of the report.

Mr. Maisch, chairman of the Committee on Legislation, read the report of this committee (see page 659), which was accepted and referred.

Professor Good, of the Committee on Invitations, read the following report, which was accepted and adopted:

TO THE PRESIDENT AND MEMBERS OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.

Your Committee on Invitations beg leave to offer the following: That they have carefully considered the numerous invitations with which we have been honored, all of which we accept with thanks.

The invitation to visit the Institute for the Blind must be accepted for to-day (Wednesday), and as carriages will be at the disposal of members and

their lady friends this afternoon at 2 P.M., we recommend that they include this institution in their trip.

We return our thanks to Mr. Arthur W. Tyler, Public Librarian ; John G. Pendergast, Chief of Fire Department ; William Glenn, Superintendent of the Institution for Educating the Deaf and Dumb ; Mr. John Collett, Chief of Statistics and Geology ; Dr. John G. Rogers, Superintendent of the Hospital for the Insane ; Statehouse Commissioners, and Crown Hill Cemetery Company, for their cordial invitations.

The freedom of the Marion County Court-house is extended, and members will find it a convenient and interesting place to visit at any time.

We recommend that the arsenal, waterworks, Kingan & Company's pork packing establishment, and P. Lieber & Company's and C. F. Schmidt's breweries, be visited next Friday afternoon after the adjournment of the session, it being delegated to the Local Committee to send notices of our intended visit.

Respectfully submitted,

J. M. GOOD,
CHARLES W. HANCOCK,
FRANK M. HARPER.

The Business Committee called up the answers to queries, and Professor Remington read a paper by Mr. Charles Mohr, on the Proximate Constituents of *Eriodictyon Californicum* (see page 736), in answer to Query 4, which was referred.

Mr. Kennedy read a paper on Fluid Extract and Syrup of Senega (see page 721), in answer to Query 10. The use of ammonia, which had been previously suggested with a view of preventing the gelatinization of the fluid extract, was advocated by the author, and elicited a discussion, in which several members communicated their experience ; the employment of a small quantity of alkali, for the purpose indicated, appeared to be generally approved of.

A paper by Mr. P. C. Candidus, in answer to Query 13, detailing the increase in the bulk of liquids by dissolving therein salts, and other solid compounds, was read by Professor Remington (see page 709).

THE SECRETARY.—This is certainly an important subject for apothecaries, and likewise for physicians, since it is often left out of consideration that liquids increase in bulk on dissolving solids therein. I would like to ask Mr. Candidus if he has made experiments with different proportions and quantities, and, if so, whether the increase has been in all cases alike ?

MR. CANDIDUS.—I had that matter in view, but had such a limited time for experiments that the whole ground could not be covered in such a manner as I would have been glad to do.

THE SECRETARY.—I think it will be found that the ratio is somewhat different according to the relative quantities of solid and fluid matter. I would suggest to Mr. Candidus to continue experimenting in this direction for another year.

Query 19, on the Conditions Necessary to Successfully Conduct Percolation, was answered by a lengthy and interesting essay by Mr. J. U. Lloyd (see page 682), which was read by Professor Remington.

PROFESSOR MARKOE.—I hope that this subject will be fully discussed. Personally I feel myself under obligations to the author of this paper; however, while I am up I wish to notice one omission, and that is in reference to the claims of Professor Israel J. Grahame to the invention of the present improved method of percolation. The percolator used by Procter, with the improvements suggested and perfected by Graham, and which are reported in the Proceedings of 1858, embody the essential features of the improvements,—all leading up to the present highly improved method.

MR. LLOYD.—I have always heard Procter spoken of as the gentleman who introduced percolation into American pharmacy. I am sure we will be pleased to make the correction.

PROFESSOR MARKOE.—I well remember with what eagerness I first followed the suggestions of Professor Grahame, and how difficult it was at first to do it. Gentlemen will find the results of Mr. Grahame's experiments and his labors in the Proceedings of 1858.

MR. MAISCH.—It will probably be of interest to Professor Markoe to learn that Professor Grahame has almost entirely abandoned the use of the funnel as a percolator, and that he now uses a cylindrical percolator.

MR. CAMPBELL.—The origin of percolation is very old; the process, then called *lixivation*, was originally adapted to the maceration of ashes with the view of obtaining their alkaline constituents in solution.

PROFESSOR REMINGTON.—This subject is one of great importance, and there is one point in connection with it which Mr. Lloyd did not sufficiently dwell upon, namely, the importance of maceration in connection with percolation, and the influence upon the results exerted by the structural characters of many drugs. When roots are taken from the ground they are in a moist condition, and their soluble constituents are in a damp or liquid state; in the process of drying off the moisture the soluble portion must shrink and collect in very small, even microscopical masses. Taking a drug that is dry, we bruise it so as to get the largest possible extent of surface, which is so very desirable, and upon getting which the value of percolation so largely depends. On maceration with the proper menstruum the soluble constituents are softened or dissolved, and if we now percolate we obtain at first a stronger solution, followed by a weaker form, and each successive layer of the drug is acted on by a successively purer menstruum, and thus the best results are obtained. There are some cases where maceration is of less value than in others,

but I think it is a very dangerous principle to work upon that maceration is unnecessary in the process of percolation.

MR. CAMPBELL.—I do not think that Professor Remington understood Mr. Lloyd quite correctly. The idea was to leave the whole of the substance in maceration with the menstruum, and to percolate at the same time.

PROFESSOR MARKOE.—As to maceration in connection with percolation, a great deal depends on the condition of the drug itself. There may be obtained, for instance, in one case the most satisfactory results, while under modified circumstances the same process would not be successful. In some cases there is no need of maceration at all. (The speaker specified several instances which would and which would not require maceration in connection with the process of percolation.)

MR. EBERLE.—I have always felt that our process is imperfect in one point, the manner in which the rate of flow is regulated. I do not believe that except under the most favorable circumstances what is called "packing" can be relied on. There is always a tendency in the liquid to form channels for itself through the mass. In my own practice I place the substance in the percolator very loosely indeed, because that will admit of circulatory percolation going on, as well as packing by gravitation. In that way we may make sure that there is plenty of circulation going on throughout the whole mass. I do not know how far large operators have ever taken the trouble to examine the mass percolated after they supposed the process finished, but I do know that if you percolate rhubarb in an ordinary glass funnel until it would seem to be completely exhausted, and if you then take out the rhubarb and examine it you will find that there are still centres within it that seem to have been very slightly permeated by the menstruum, and in some instances not at all,—that the fluid has made for itself channels all around those centres without even so much as touching them; consequently, I most strongly advocate the conducting of percolation in such a manner that circulatory displacement may be secured to the greatest possible extent.

Professor Diehl moved, and it was seconded by Professor Markoe, that a vote of thanks be tendered to Mr. Lloyd for his able and interesting paper. The motion was agreed to.

Mr. Kennedy read a paper in answer to Query 24, on the Absorption of Moisture by Glycerin under Different Circumstances (see p. 724).

The Business Committee stated that Mr. Crawford had been taken sick, and the chair appointed Professor Good to act, in case of necessity, in Mr. Crawford's place as a member of the Committee on the Next Annual Meeting.

A volunteer paper by Mr. W. T. Ford on the Galenical Preparations of the Pharmacopœia (see page 734) was read by Professor Remington, and, on motion of the Business Committee, referred to the Executive Committee with discretionary power.

MR. EBERT —I would like to make a few remarks in regard to papers that are submitted here in answer to the queries published. Some gentlemen seem to think that some of the queries are unworthy of notice, and that therefore the papers in answer to them should be thrown aside. Now, sir, I think it unjust, that after a member has prepared a paper in good faith, and has read it to the Association, to refuse it a place in our Transactions. We may not all of us be as wise as the wisest are, but we all know something, and I feel that there are none of us but who may learn something of value from these papers.

CHAIRMAN OF BUSINESS COMMITTEE.—Mr. President, I think our Executive Committee has a discretionary power to decide as to what shall and what shall not be published with the Transactions of this society. We have many valuable papers brought here, and some that are not so valuable. It is no reflection upon the Association to say that papers are sometimes published in our Proceedings that ought not to be published. Here, for instance, comes a man who knows a little about pharmacy, fills a score of pages of foolscap, and after having offered it in vain to all the local societies within reach, and having found that none of them would touch the paper, he brings it to us, and we sit and listen to the reading of it; it goes to press with our Transactions, and we send the nonsense broadcast over the world. There ought to be, and I think there is a discretionary power in the Executive Committee, under the provisions of the by-laws, by which worthless and erroneous papers can be suppressed. I believe the Committee have that power, and they ought to exercise it.

MR. EBERT.—Sometimes the chairman of the Committee on Papers might exclude the very matter that we are most anxious to get,—the very thing that we are more eager to be informed on than anything else. We have queries proposed, and they are accepted; we expect them to be answered, and the authors expect to be heard. I do not think it is right after we have asked members to do the work, for us not to give them a chance to be heard.

MR. MENNINGER.—I think Professor Ebert misapprehends the object of this Association and kindred ones. This is not a place for primary pupils to air their crude opinions in. The best place for the primary pupil in pharmacy is the shop. This is an association of reputable pharmacists. There is no need of sending broadcast over the country the crude views of any member. There is another way to get at this. I want to get up discussion and an expression of opinion. The American Scientific Association has a committee to whom all papers are to be presented in advance, and that committee decides which shall be read and which shall not; and in that way much time as well as money is saved to the association.

MR. EBERT.—In reply to Dr. Menninger, I would say just this: There is a difference between the rights of the committee over volunteer papers, and their rights over such papers as have been prepared in good faith in answer to queries propounded by the Association and published in its Proceedings. The committee prints these queries. A member accepts one of them, and the society prints his name in connection with it, and holds him forth to the public as the person who is to read a paper on the subject of that query.

After that the Executive Committee has, in my opinion, no discretion as to publishing the paper presented.

PROFESSOR MARKOE.—In my judgment our committee should not hesitate for a moment to reject anything on any subject that is not fit for publication.

At the request of members the Secretary read chapter vi, article iv, of the by-laws, on the subject of the duties of the Executive Committee, relating to the publication of the Proceedings: "Which publication shall contain full minutes. . . . together with such addresses, scientific papers, discussions, notices of new processes, and preparations as the *Executive Committee may deem worthy of insertion.*"

PROFESSOR REMINGTON.—Mr. President, I think that is a wise provision of our by-laws, intended to confer the power to cut out papers that were not worthy of publication.

MR. WHITFIELD.—At a meeting held three years ago in Philadelphia, it was insisted by some that the whole discussion should be published; but afterwards it was found that the publication would be doing the author of such paper as well as every member, not injustice but justice, by not publishing them. I think this Association would be doing strict justice to the authors of some of the papers presented here by not publishing them at all. If a man's paper is laid aside and not put in print, he may try harder to write a good paper the next time. Our space is too precious to throw any of it away.

MR. WELLCOME.—We should not overlook the fact that these publications of our Transactions are read and referred to, not only by members of the Association, but by many others. Therefore I think that all papers possessing no merits at all should be promptly rejected. It is doing a favor to any man who has made a blunder not to publish his paper.

MR. EBERT.—Mr. President, who is that one all-competent person who is to be the judge of the value of all the various papers that may be written by members of this Association? Have we such a man? If so, where is he? Let us look at him! No, sir, he is not to be found. We should try to make this Association and its work a little more practical. I am not in favor of a one-man power, nor am I willing to abide by any one man's judgment as to what should be read and what should not. I have often listened to men who possibly knew a little less than I, and have still learned something from them. I think the profession will always gain something by the publication of these papers that are prepared and presented to the Association.

MR. EBERLE.—This Association undoubtedly should throw open its doors to the pharmacists of the country, irrespective of their scientific abilities, and give them the largest license. I believe the best discussion we ever had was stimulated by the offer of a paper so defective that its very defects brought up many arguments.

PROFESSOR REMINGTON.—I would like to hear the voice of our friend Professor Maisch on this subject. He has a great deal of experience in connection with the publication of papers. As for myself, I fully agree with the sentiment expressed here, that it is only justice, where a man sends in a worthless paper, to send it back to him. It is for his own good that it should not be put before the public to disgrace him.

THE SECRETARY.—I have been listening quite attentively to this discussion. This is the fifteenth annual meeting in which I have been present acting as your Secretary, and during all that time, and one or two years previous, I have had charge of the publication of the Proceedings, as chairman of the Executive Committee or as Secretary, so that I have an experience that extends over nearly two-thirds of the lifetime of the Association. The power of excluding papers was always granted to the Executive Committee, and during my experience it has been uniformly exercised with a great deal of caution. Papers have been handed in for publication that were not altogether in a condition fit for publication. In such a case, if the error was discovered in time, the papers were handed back to the authors pointing out the errors they contained, and the authors themselves made corrections, and their papers were published in a slightly modified form. In one or two cases the author did not choose to make the alterations that were suggested or admit the correctness of the alterations proposed, and the author withdrew the paper. If the errors were not discovered in time, slight modifications were made, or the point covered by an editorial note. The Association has sometimes ordered papers for publication that were not ready at the meetings, and in such cases the Secretary has asked the author to modify his paper if he thought it to be incorrect. In one case it turned out that an editorial note of the Secretary was incorrect, and this was not ascertained until it was too late to withdraw the supposed correction except through the Secretary's annual report. I know that papers have been presented and published that were not strictly scientific papers, not such papers as one would expect to read in the transactions of the academies of sciences, and yet they were mostly practical, and it was deemed proper to publish them. Often those papers have not shed any glory on our Proceedings; yet they have never done any discredit to this Association. I hope you will leave that matter stand in the by-laws, and I assure you that so far as I am concerned in the future, as in the past, that power shall be exercised with extreme caution, coupled with the endeavor to publish nothing that would bring discredit upon the Association.

CHAIRMAN OF BUSINESS COMMITTEE.—This subject was brought forward, I believe, without a motion. I move the Association adjourn now till 9 o'clock to-morrow morning.

The motion prevailed, and the session was pronounced closed.

Fourth Session.—Thursday Morning, September 11th.

The session was opened by President Sloan. The Secretary read the minutes of the Third Session, which were approved.

Queries being called up, Mr. Saunders read an essay on the Preparation of Infusions and Decoctions from Fluid Extracts, in answer to Query 15 (see page 710).

On motion of the Business Committee, the report of the Committee on Rules for the Election of Members was taken up for consideration, and the Secretary read the amendments to the by-laws, as proposed by the committee (see page 783). Professor Remington further explained the proposed amendments, which were then taken up *seriatim* for action.

Chapter vi, article ii, section 1, was adopted as proposed.

Article ii, section 2, having been read, Professor Good moved to amend by striking out "two-thirds," and inserting "three-fourths." The amendment to the amendment was discussed by Messrs. Remington and Roberts, and then withdrawn by the mover. The question recurring on the amendment as proposed by the committee, it was adopted.

Article ii, section 3, was likewise adopted as read, and Mr. Ebert suggested, in connection therewith, that the members of the Executive and Business Committees should hereafter endeavor to give more aid to their chairmen in the discharge of their duties.

Chapter vii, article ii, was amended in conformity with the proposition of the committee, by striking out the last paragraph.

Chapter viii, article ii, section 5, was modified as proposed by the committee.

PROFESSOR REMINGTON.—Mr. President, our experience at this meeting is but a repetition of what has frequently occurred before. When important matters are presented to the Association, some one springs some trifling matter of detail business, or some matter of parliamentary practice, which will, as like as not, consume the whole of the session, and the consequence is that nothing is accomplished beyond referring the matter to a committee. The committee worries with it awhile, and makes its report, and the whole thing comes up again for discussion at a subsequent time, and still more of the valuable time of the Association is consumed by it. I apprehend that by far the greater number of members come to our meetings, not for the purpose of hearing a discussion on some little point in parliamentary law that may be raised, for instance, in connection with the admission of members, but for the sake of having the benefit of the scientific discussions that may take place, and

listening to the reading of scientific essays on subjects of importance to the profession. It strikes me that all mere matters of business should be referred, in the first instance, to a business council, as is the case, to a great extent, in the scientific associations of Europe, and as is also the case in many of our own societies. No one can doubt that by such means a large amount of valuable time could be saved, and the Association greatly relieved, while the business council would be responsible to the Association for all that it might do. Of course to adopt this plan would require a material change in the by-laws; and in order to bring it before the Association in some kind of shape, I move the appointment of a committee of five members, whose duty it shall be to devise a plan which shall place all the business details of the Association in the hands of a council, and report such plan to the Association at the next annual meeting.

MR. EBERT.—I heartily indorse what Professor Remington has said. I happened to be present at a meeting of the British Conference, and saw this plan in operation. That is the way they do their business, and it leaves an amount of time for papers and discussions that is a great desideratum in any scientific body. Their business council meets just before the time fixed for the meeting of the Association, and the various matters of business that arise are there disposed of, so that the Conference has vastly more leisure for scientific discussion than we have here. It looks like folly to travel a thousand miles to listen to disputes about petty questions of parliamentary law.

PROFESSOR MARKOE.—I also had the good fortune to be present at a meeting of the British Conference, which was held at Dublin, last year; and so admirably were the minor details of business taken care of by their council, that nearly the whole time of the meeting was devoted to the reading of papers and to the exchange of thoughts and experience upon scientific subjects.

THE CHAIR.—The question is upon Professor Remington's motion to appoint a committee of five to devise a plan embodying the suggestions made as to a business council.

The motion prevailed, and the chair appointed the following gentlemen said committee: Messrs. Joseph P. Remington, of Philadelphia; J. F. Judge, of Cincinnati; J. U. Lloyd, of Cincinnati; G. F. H. Markoe, of Boston, and E. H. Sargent, of Chicago.

The Business Committee called up the report of the special committee to which was referred the President's annual address. Said report was read and adopted, as follows:

The Committee on President's Address most respectfully report that they have carefully considered the very able address of our retiring president, G. J. Luhn, and whilst they commend generally the recommendations contained therein, do not think any special legislation requisite to give them effect.

JOSEPH ROBERTS,
E. H. SARGENT.

The report of the special committee to which had been referred the reports of the Secretary and Treasurer, was read by Mr. Roberts, as follows:

Your committee respectfully report that they have duly considered the recommendations of your Permanent Secretary, and advise, in accordance therewith, that the President of this Association be requested to appoint, in every locality where more than three members reside, a local agent, whose duty it shall be to aid the Treasurer in the collection of members' dues in his section, and to procure new members by placing before the pharmacists, and others eligible to membership, the great advantages that they will derive from associating themselves with this body.

We further advise, that all members who join this Association as delegates shall, in future, be required to pay the initiation fee.

We further advise, that the Executive Committee be requested to reduce the size of our published Proceedings as far as in their judgment may be practicable without impairing their value as a true record.

We further advise that the Permanent Secretary, under the direction of the Executive Committee, be authorized and directed to dispose of such publications in his charge, or that may from time to time come under his charge, and may be of no further use as the property of the American Pharmaceutical Association, to the best advantage, and pay over the proceeds to the Treasurer.

In the matter of the Treasurer's report we advise that he be requested to furnish, as part of his annual report, a tabulated statement of receipts and expenditures. We further state that in our judgment the fault that a balance on hand is always shown by our Treasurer in his annual report, when, in fact, we have to publish our Proceedings upon the credit of the ensuing year, is due to the fact that our fiscal year commences in September, and advise that in future our fiscal year commence June 1st, and that members' dues be then collected. Should this recommendation meet the approval of the Association your committee believe that the true financial condition will be more truly shown.

Your committee further state that whilst no one of these recommendations will cause a large saving to the Association, yet, if all meet your approval, that a saving of several hundred dollars will accrue to the benefit of this Association, without detriment to its proper working and usefulness.

JOS. ROBERTS,
GEO. W. KENNEDY,
CHAS. L. EBERLE,
JOHN M. MAISCH,
E. H. SARGENT,
CHARLES A. TUFTS.

THE SECRETARY.—Two or three of the propositions contained in this report involve a change in the by-laws, and of course they will have to lie over. The remainder of the report may be acted upon now.

DR. MENNINGER.—I suggest that as there are a number of different propositions in this report it would be well to have them arranged in proper order, so that we may act upon them with our eyes open. I move that Professor Remington be appointed a committee of one to formulate the recommendations of this report, and present them to the meeting.

The motion prevailed.

Mr. Ingalls, from the Auditing Committee, read the following report:

The Committee appointed to audit the accounts of the Treasurer, Charles A. Tufts, respectfully report that they have examined the Treasurer's books, carefully compared his payments with the vouchers, and find them correct, showing a balance in favor of the Association of \$980.98 dues.

In addition to the above the committee take great pleasure in complimenting the Treasurer for his neatness and business accuracy of keeping his accounts.

JOHN INGALLS,
CHARLES A. HEINITSH,
GEORGE BUCK.

INDIANAPOLIS, September 11th, 1879.

The report was on motion adopted, and the committee discharged.

Professor Diehl read the report of the Committee on the Revision of the Pharmacopœia, and read a number of typical formulas and other portions for the purpose of showing the manner in which the work has been performed. (See Report on page 667, and some of the formulas on pp. 672–677.)

Vice-President Baker occupied the chair.

The following papers, which had been contributed to the Committee on the Revision of the Pharmacopœia, were read: On Diluted Alcohol, by Professor William T. Wenzell (see p. 705); On Spirit of Nitrous Ether (p. 723), On Citrate of Iron and Ammonia (p. 741), On Citrate of Iron and Quinia (p. 743), On Tartrate of Iron and Potassium (p. 744), and on Hydrated Oxide of Iron (p. 740), the last five papers being from Mr. J. U. Lloyd. The several papers were accepted, and referred to the Executive Committee.

Professor Diehl read an essay entitled "Second Report on Fluid Extracts" (see p. 727), and illustrated the subject by diagrams. The paper was referred for publication.

DR. ROSS.—It must be clear to every mind that so valuable a report ought not to be lost. It has cost a great deal of time, a great deal of research, and

a great deal of experimenting, and I do think the report which embodies the results of all this effort ought to be published in full, and a copy of it put into the hands of every member. I therefore move that the report of the Committee on Revision of the Pharmacopœia be published in cheap form, and that it be not distributed but sold to the members of the Association, so that they can examine it, and so far as they can, make improvements on it.

PROFESSOR DIEHL.—I move to amend that the Secretary be instructed to correspond with the various Pharmaceutical Associations that are here represented, asking from them a contribution to aid in the publication of this work, and the carrying out the suggestions made by Dr. Ross.

MR. ROBERTS.—It seems to me that it would be unwise to publish this report if it would result in giving to the publication the authority of this Association. Before anything like that is done it should be placed in the hands of a committee to revise it. It will receive no authority till it is adopted by this Association.

THE SECRETARY opposed the publication of the report on account of its incompleteness, and because the greater portion of it represented merely the views of the individual members, since it had been impossible for any considerable portion of the committee to meet and discuss the propositions. He also urged that many druggists would regard this report as the finally revised Pharmacopœia, while on the other hand societies entitled to representation at Washington, who had neglected the preliminary revision, would make this the basis of their own report, hurriedly gotten up, and thus give, by the force of numbers, undue weight to what may be erroneous views. He held that the good really accomplished by the committee was the perfection of a general plan for the next Pharmacopœia, and that then it became the duty of every college of pharmacy and pharmaceutical society to revise the Pharmacopœia in accordance with their own wants and experience, in order to secure a Pharmacopœia which would be adapted to the wants of the whole country.*

DR. MCKININGER.—I think the publication of this report will have a good effect. If we were to publish only such things as everybody more or less comprehends our publications would be very few indeed. The members of the Pharmacopœial Convention in 1880 should have this report before them. The labors of the Pharmacopœial Conventions held heretofore extended over two or three years before the revised Pharmacopœia was published. The labor performed by this committee was great, and its results are valuable. There is nobody more interested in the results of that meeting than the pharmaceutical profession, and upon them will devolve in a great measure the work that is to be done.

MR. GARDNER —The members of our society all feel the greatest interest on this subject. We all feel that we would like to have this report.

MR. EBERT.—If this report were published in a cheap form, with blank leaves inserted, and it were then sent out to whomsoever wished to purchase

* The stenographer failed to take down any portion of these remarks, and it is believed that other portions of the same discussion are very imperfectly reported.—EDITOR.

it, they could easily write out the results of any experiments and investigations they might make, and these being sent eventually to the National Committee of Revision at Washington would constitute a far more complete report than we have ever had in that line before. It is only by such a comparison as that would enable us to make that we will ever obtain a really good Pharmacopœia. The difficulty thus far has been this: Individual colleges and associations have brought their reports with them to the National Convention at Washington, and presented them there. Individually we knew nothing about the reports of other organizations. They were then committed to the Committee on Final Revision.

PROFESSOR GOOD.—I understand Professor Maisch to object to the publication because he thinks we are pushing the publication in an incomplete form. It seems to me that the report of the committee might be accepted, and these gentlemen invited to continue their work.

THE SECRETARY.—Regarding the suggestion of Professor Good I would state that if the intention is to have the whole report laid before the members for the purpose of criticism, that object cannot be accomplished if you wait for the completion of the report. If the manuscript was now placed in the hands of the printer it would take more than a month to print it. The general plan upon which the Committee on Revision of the Pharmacopœia was to act was published twenty months ago, and there has been plenty of time for those who wanted to revise the Pharmacopœia on that or any other plan. Now, however, there remain only seven or eight months before the Convention will meet in Washington. You propose either to publish an incomplete report or to wait until it is completed. It may not be a completely revised Pharmacopœia before some time next March. How can you expect within the short space of time that will then be left to send it out to every member of the Association, get his criticisms on it, and then get them all back in time for the Convention, which meets in May. I know very well that this is a work, not of weeks, but of years.

MR. VOGELER.—In Germany every one that has any idea to communicate writes out his suggestion, whatever it may be, and it is published in the pharmaceutical journals.

DR. MENNINGER.—I have not a doubt in my mind but what there are colleges enough represented in this room at this very time to guarantee the money necessary to make this publication within five minutes.

PROFESSOR MARKOE.—I do not believe that the work of the revision of the Pharmacopœia is going to end with the Convention of next year; on the contrary, the work of final revision will be left to a committee, and that committee, I take it, will be as much in need of the help and suggestions of those who have labored in this enterprise as at any former time up to the end of its labors.

Professor Diehl modified his amendment as follows:

Resolved, That the report on the Pharmacopœia, as presented at this meeting, be published in cheap pamphlet form, provided the expenses of the same

be defrayed by the various colleges of pharmacy and pharmaceutical associations in the United States.

This was accepted by Dr. Ross, and the resolution was agreed to. Immediately after its adoption the members of several societies pledged different amounts towards the publication of the report, and it was understood that the whole matter was to be left in charge of the committee until May next, from which date the committee be discharged, in accordance with their request.*

The Executive Committee announced the names of twenty-four candidates for membership. Under the recently adopted rules the election is deferred to the next session.

Mr. Wellcome gave from notes an account of his recent visit to the cinchona region of South America, and exhibited numerous specimens of sections of trees and of cinchona barks collected by himself. He was requested to complete his paper for publication.†

On motion the Association adjourned until 3½ o'clock P.M.

Fifth Session.—Thursday Afternoon, September 12th.

The Association met at the appointed hour, President Sloan in the chair. The Secretary read the minutes of the fourth session, which were on motion approved.

The Executive Committee reported the withdrawal of two of the twenty-four applicants for membership reported at the fourth session. A ballot was ordered for the following twenty-two candidates:

* The name of Mr. William Saunders, of London, Ontario, was accidentally omitted from the list of the Committee on Revision of the Pharmacopœia, as published in Proceedings, 1877, page 5, and the Secretary's attention not having been called to this omission, the correction was not made in Proceedings, 1878. The Chairman, Mr. Rice, has informed the Secretary that Mr. Saunders has made valuable contributions as a member of the committee.

† A portion of this paper, and another paper read by notes at a subsequent session were lost in the mail, necessitating their rewriting and considerable delay.—SECRETARY.

Illinois.

Delbert Elwyn Prall, Chicago.

Indiana.

Josiah H. Andrews, Seymour.

Joseph Barthels, Indianapolis.

Nathan W. Edwards, Fairmount.

William Armetrong Irvin, Kokomo.

Louis H. Mueller, Indianapolis.

Joseph B. Perry, "

Arthur Timberlake, "

Nathan Webb Yeakel, La Fayette.

Michigan.

Caspar Edward De Puy, Chelsea.

Missouri.

F. G. Pauley, St. Louis.

New York.

William M. Davis, Brooklyn.

David De Graff, Nyack, Rockland Co.

Harvey G. Goodale, Jamaica, L. I.

Edwin Bradford Hall, Wellsville, Alleghany Co.

A. J. Inloes, Binghamton.

Luther F. Stevens, Jamaica, L. I.

Justin Wohlfarth, New York.

Ohio.

Thomas Dover, Dayton.

N. G. Hildreth, Cheviot, Cincinnati.

A. C. Wallace, Bellefontaine.

Wisconsin.

R. Bruce Arnold, Geneva Lake.

Messrs. Wells, of Cincinnati, and Good, of St. Louis, were appointed tellers, and reported the unanimous election of the candidates.

Professor Remington read a paper by Mr. C. S. N. Hallberg on the Galenical Preparations of the Pharmacopœia, and on Saccharated Extracts. It was referred to the Executive Committee (see page 715).

The Business Committee called up the following amendment to the Constitution, lying over from the twenty-fifth annual meeting:

Strike out in third line of Article I the words "the United States," and insert in place thereof "America," so as to make the sentence read as follows:

"Its aim shall be to unite the educated and reputable pharmacutists and druggists of *America* in the following objects."

The proposition was discussed by Messrs. Remington, Garrison, Maisch, and Diehl, and was passed unanimously.

The amendments to the by-laws, proposed last year by the Committee of Ways and Means, were taken up as the special business referred to this session on the previous day. The first amendment proposed is as follows:

Resolved, That Article V, Chapter VII, of the By-laws be amended to read: Any member not in arrears to the Association, who shall pay to the Treasurer the sum of \$75 during the first year of his connection therewith, or after five years \$70, or after ten years \$60, or after fifteen years \$50, or after twenty years \$40, shall become a life member and shall be exempt from all future annual contributions.

The proposed change was further explained and advocated by Messrs. Eberle and Roberts.

THE SECRETARY.—For several years past I have advocated strongly the adoption of such a course for the purpose of establishing a permanent fund. When life membership under the old Constitution, after the payment of ten annual dues, was abolished, to my regret a modified form on the plan now proposed was not adopted by the Association. If it had been done then I am satisfied we would now have a permanent fund. We have a number of members belonging and contributing to the Association for from fifteen to twenty-five years, and I do not think it is justice to require them to pay for life membership as much as a new member. I am glad that the Committee of Ways and Means last year brought such a plan forward, and I hope that some of those who have become life members under the old plan will embrace the opportunity and become life members upon the new basis. It is easy to see that if a large number do so the available income of the Association will be less for some few years than now, but I have every confidence in all the members that they will lend their aid in seeing the Association safely through that period, and afterwards the advantages of the change will be obvious in its practical results as a reliable income from a permanent fund, which will be available even after the members having contributed towards it shall have passed away.

The question was taken on the proposed amendment, and it was unanimously adopted. Immediately after the adoption a member handed a check for the amount of his life membership to the Treasurer, and several members announced that they would also become life members, and continue for two or three years to pay the regular annual contributions.

The second amendment was read as follows:

Resolved, That at each annual session the Auditing Committee shall, if necessary, determine a per capita tax to cover estimated deficiencies for the fiscal year, to be levied and collected with the yearly contribution.

THE SECRETARY.—I believe the Association has a right to levy a special tax on all members, including life members, who are merely exempt from the annual dues. The proposed amendment makes it the duty of the Auditing Committee to ascertain whether or not it shall be levied. No harm can result from putting this clause into the By-laws. But I should be loath to see such a tax levied in any case where it is not absolutely necessary, and I do not believe that it need be done.

MR. SARGENT.—The only reason I ever had any objection to that measure was on account of the odious character of a *per capita* tax.

PROFESSOR REMINGTON.—Mr. President, in view of the action taken this morning, which I am confident will certainly have a highly beneficial effect

upon our finances, I move that this second recommendation be indefinitely postponed.

The motion to indefinitely postpone was agreed to.

The third recommendation was read, as follows:

Resolved, That the Secretary shall notify life-members of the publication of each year's Proceedings, and furnish the same to such upon their subsequent application.

THE SECRETARY.—Mr. President, I rise for the purpose of making a motion to indefinitely postpone this proposition. I do not want the Permanent Secretary of the Association at any future time, whoever he may be, to be burdened with unnecessary labor, while he has more important work to do for the Association. As to the loss of copies of our Proceedings, which the amendment is intended to prevent, such occurrences are very rare now. We know now where almost every life-member of the Association lives.

THE BUSINESS COMMITTEE.—If the Secretary is satisfied I am sure we are. He made a report stating that he had had a great deal of trouble in discovering the residence of some of our life-members. If he has it now arranged so that it is satisfactory to him, the committee does not desire to force any change upon him. We thought it was but just and reasonable, under the circumstances described in his report on the subject, that these people should notify the Secretary that they wished the Proceedings sent to them if they wanted them.

THE SECRETARY.—We have some five or six life-members under the old arrangement who do not desire to receive the Proceedings, but only to have their names continued upon the roll.

MR. SARGENT.—I would like to inquire whether the new life-members receive each a copy of the Proceedings the same as the rest?

THE SECRETARY.—They do.

THE CHAIR.—The question is on the motion of Professor Maisch to indefinitely postpone the third recommendation of the Committee of Ways and Means.

The motion prevailed and the proposed amendment was indefinitely postponed.

Professor Remington read the following report:

In order to carry out the recommendations of the Committee on the Secretary's and Treasurer's Reports, which were presented at the fourth session, it will be necessary to strike out of chapter vii, article iii, all of the words after the word "year," which are, "with the exception of delegates, as provided in article vi of this chapter."

In article vi strike out the word "without," on the last line, and insert the word "and."

The word "and," in the third line of article vi, should also be eliminated.

PROFESSOR REMINGTON.—Mr. President, I wish to call attention to the necessity that exists of making these amendments to our by-laws growing out of our action at this meeting. They are in chapter vii, articles iii and iv, in regard to the payment of the initiation fee by delegates. They amount to mere clerical alterations or corrections of the by-laws in order to make them consistent with the action we have taken.

Both amendments were adopted as proposed; and, on motion of the Secretary, the remaining recommendations contained in the report of the Committee on the Secretary's and Treasurer's Reports were likewise adopted.

MR. SARGENT.—I want to know if it is not the opinion of the meeting that the interests of the Association would be best served by having a local agent to see the druggists, in his town or neighborhood, in regard to their becoming members.

MR. EBERT.—If you would make it a live committee for obtaining the applications of persons for membership, I believe in that way the number of our members could be very greatly increased. It was by precisely that method that the membership of the British Pharmaceutical Conference was largely increased. There was a committee appointed consisting of a number of efficient men, who made it a business to write to men engaged in the profession, and ask them to become members of the Conference. I think the suggestion is one that is well worth attention.

THE SECRETARY.—We have already ten or twelve local agents, and if the President carries out the spirit of the resolution (and I have no doubt that he will) we shall have perhaps forty to fifty authorized agents, through whom those who are not members can be reached.

MR. EBERT.—The trouble is, you would have to have somebody stirring them up all the time.

PROFESSOR REMINGTON.—It seems to me that in the light of the recommendation of the Secretary, in his report, one of our greatest needs just now is an increase of membership. I think the appointment of a committee for that purpose, at this time, would be an excellent idea, in order that we may be lifted as quickly as possible out of our present depressed financial condition.

Mr. Ebert moved that a committee of three be appointed to solicit persons to become members of the Association, and use all available means to increase the membership in the Association during the next year.

The motion was carried, and the chair appointed as such committee the following gentlemen: E. H. Sargent, A. E. Ebert, and John Buck, all of Chicago, Ill.

Mr. Sargent declined the appointment, and suggested Professor

Markoe in his place, who likewise declined. Messrs. Ebert and Buck also declared their inability to attend to such duties.

On motion of Mr. Eberle it was resolved that the committee be increased to five members; and the chair appointed Messrs. P. W. Bedford, of New York; E. C. Jones, of Philadelphia; S. A. D. Sheppard, of Boston; R. H. Cowdrey, of Chicago, and George A. Schafer, of Fort Madison, Iowa.

Professor Markoe offered the following:

Resolved, That a committee of three members be appointed to receive subscriptions and publish the report of the Committee on the Revision of the Pharmacopœia, as directed by the resolution passed at the fourth session.

The resolution was adopted, and the chair appointed as such committee: Dr. Ross, of Lebanon, Pa., Dr. Rice, of New York, and Professor Diehl, of Louisville, Ky.

Professor Markoe called up the amendment to the by-laws offered by him at the second session, and which provides that the officers should take their seats at the beginning of the last session.

PROFESSOR GOOD.—Before we adopt this we had better determine when the "last session" begins. We may have an afternoon session on Friday and we may not.

PROFESSOR MARKOE.—The object I had in view was to arrange it so that the officers shall occupy their places at the time when they are prepared for the duties of their respective stations. At present it is just the other way.

PROFESSOR GOOD.—I think Professor Markoe has a good point there. Could not the officers be installed immediately before the adjournment, and might not this proposition be worded in that way, so as not to say at what session they shall take their seats?

THE SECRETARY.—I think I shall vote against this proposition. The office of President in this Association is entirely different from what it is in the British Pharmaceutical Conference. There he remains in office for two years. In many other societies he remains in office "during good behavior," or for an indefinite length of time. We, however, see fit to change him every year, and we have never yet had a presiding officer who was incapable of presiding acceptably to the Association. Besides, the president is not without counsel. Generally, our friend Tufts is on his left, and he is one of the best parliamentarians in the room.

The proposition of Professor Markoe did not prevail.

Professor Remington commenced reading a report on Tinctures as a part of his contributions towards the revision of the Phar-

macopœia, but without concluding it gave way to the Executive Committee, who reported the application of one gentleman for membership, action on which lies over until the next session.

Mr. Davis read the following report :

INDIANAPOLIS, September 11th, 1879.

TO THE AMERICAN PHARMACEUTICAL ASSOCIATION :

Your committee on selecting and recommending the place and time for the twenty-eighth annual meeting of this Association, beg leave to report, after due consideration, considering the claims of such locations as were presented, that the village of Saratoga, New York, is in our opinion the most suitable place, and the second Tuesday in September the proper time for said meeting.

VINCENT DAVIS,
WILLIAM H. CRAWFORD,
HIRAM E. GRIFFITH,
Committee.

The report was accepted, and the recommendations severally adopted, after which the Association adjourned until 9 o'clock Friday morning.

Sixth Session.—Friday Morning, September 12th.

The meeting was called to order by President Sloan, and the minutes of the fifth session were read and approved.

A ballot for the proposed candidates for membership being ordered, Messrs. Wells, of Ohio, and Good, of Missouri, were appointed tellers, and reported the election of Mr. Dundas Dick, of New York.

A reconsideration of the ballot was moved, and the motion was seconded. A discussion arose, in which Messrs. Candidus, Roberts, Menninger, Ebert, Diehl, Bedford, Remington, Maisch, and Tufts participated, after which the chair decided that the motion could be entertained only by unanimous consent, when the motion was withdrawn.

Ballots were then had on the application of Messrs. Julius A. Haag, of Indianapolis, and John Frank Brandon, of Anderson, Ind., and the candidates were duly elected.

The Secretary announced having received credentials from the California Pharmaceutical Society and California College of Phar-

macy, accrediting Messrs. G. G. Burnett and John Calvert as delegates. The document was ordered to be filed.

The Executive Committee announced the names of five candidates for membership.

Mr. T. R. Baker, in behalf of the Nominating Committee, nominated Mr. Charles F. Fish, of Saratoga Springs, N. Y., Local Secretary for the ensuing year. A ballot being ordered the President was directed to cast an affirmative vote for the member nominated Local Secretary, which being done, Mr. Fish was declared duly elected.

On motion of the Business Committee the Association adjourned until 11 o'clock A.M.

Seventh Session.—Friday Morning, September 12th.

President Sloan opened the session. The Secretary read the minutes of the fifth session, which were approved.

A ballot was ordered for the following five candidates: Adolph Metzner, Indianapolis, Ind.; Hazen W. Adams, Hackensack, N. J.; Edward Frederick Kessler, Louisville, Ky.; Henry A. Mott, Jr., New York City; Joseph Games Underhill, Brooklyn, N. Y.

Messrs. Wells, of Ohio, and Good, of Missouri, acting as tellers, reported the unanimous election of the candidates.

Professor Bedford addressed the chair as follows:

MR. PRESIDENT: I wish to seize the present moment to make a few remarks in regard to the Centennial Fund. At the last meeting there was on hand in the hands of the committee the sum of \$168. The committee has been assiduously working to increase the fund, and now have to report as on hand \$354. Gentlemen have responded cheerfully and liberally to the calls made upon them. We desire, however, to make sure that in raising this fund no single member shall fail to have a part. We are exceedingly anxious that none shall be overlooked, and trust that if there are any that have not been called upon they will at once make it known, and the committee will give them a chance to aid in the good work. There is at the present time about \$175 needed to make up the amount that we must raise in order to make good our claim to the donation of \$525. It can be raised, and it seems to me should be raised at once.

PROFESSOR DIEHL.—I suggest that the committee which was appointed to act with the Executive Committee in raising this money be continued, with authority to act during the coming year, and to collect money for the Centen-

nial Fund at the annual meeting of 1880, if we can get an extension of the time within which the money is to be raised.

MR. KENNEDY.—There are several members who have privately promised to lift collections in their different cities in aid of this fund, and I think it can and will be collected readily enough without continuing the special committee.

No action was taken on the suggestion of Professor Diehl.
Professor Bedford presented the following :

Resolved, That a committee of three be appointed by the Chairman, whose duty it shall be to secure favorable terms for railroad transportation to our next annual meeting at Saratoga Springs, and that they be authorized to delegate such power as may be necessary to aid them in their duties.

DR. MENNINGER.—I think the appointment of that committee is probably unnecessary, inasmuch as the duties in connection with the fund have hitherto been satisfactorily performed by the Local Secretary, the Permanent Secretary, and Executive Committee, and no fault has been found with their management, so far as I have heard.

PROFESSOR BEDFORD.—It was found that the secretaries had work enough on their hands without these specific duties, and it was thought best to relieve them of a portion of their work.

THE SECRETARY.—The Secretaries have never shirked any of their duties ; but if the arrangements heretofore made were not satisfactory, then, of course, they would give way.

The motion was lost.

Professor Remington continued the reading of his report on Tinctures as a part of the report on the Revision of the Pharmacopœia.

Professor Markoe moved the following :

Resolved, That the thanks of this Association be gratefully tendered to the very efficient Local Secretary, Mr. Eli Lilly, to the members of the "Local Committee," and to the pharmacists and druggists and their ladies, of the city of Indianapolis, for the very cordial reception and generous entertainment accorded to visiting members and their ladies during the time of the twenty-seventh meeting of the Association.

Resolved, That the thanks of this Association be given to the press of Indianapolis for the able manner in which they have reported the proceedings of this Association.

Resolved, That the thanks of the American Pharmaceutical Association be offered to the city government of Indianapolis for the official recognition accorded to this Association through her chief magistrate, Mayor Caven.

Resolved, That the thanks of the Association be tendered to the citizens of

Indianapolis for the many courtesies that have been so cordially offered to the visiting members and their ladies.

Resolved, That the thanks of the Association be and are hereby given to the retiring and present officers of this body for the prompt and efficient manner in which they have discharged the duties of their several positions.

The resolutions were seconded, and the question being taken by Mr. Tufts they were severally adopted.

Professor Judge, from the Committee on Papers and Queries, presented the following report:

LIST OF QUERIES.

To be Answered at the Twenty-eighth Annual Meeting, 1880, to be held at Saratoga, New York.

QUERY 1. Vaseline has, to some extent, taken the place of simple ointment in extemporaneous pharmacy. A preparation of similar character, but of greater consistency, would be a valuable addition to the Pharmacopœia. A working formula with specimens is desirable.

Accepted by W. H. Crawford, St. Louis, Mo.

2. In the preparation of the medicated waters of the Pharmacopœia Carbonate of Magnesium is generally ordered to be used. Such waters are incompatible with many salts and cause precipitates. Can some insoluble substance be used in place of the Carbonate of Magnesium, which shall answer the like purpose, and not be open to the same or other objections?

Accepted by Robert H. Cowdrey, Chicago, Ill.

3. Acidum Sulphuricum Aromaticum, of the United States Pharmacopœia, upon standing deposits a precipitate. How can this be remedied? Give a working formula, with specimens of the finished product.

Accepted by A. L. Snyder, M.D., Bryan, Ohio.

4. Would the substitution of Citrate of Sodium for Citrate of Ammonium in the officinal Pyrophosphate of Iron make the latter less liable to become insoluble on keeping?

Accepted by Charles Caspari, Jr., Baltimore, Md.

5. Tinctura Ferri Chloridi, of the United States Pharmacopœia, frequently lets fall a precipitate. Is this due to the alcoholic strength of the preparation? If the tincture contained less alcohol, and more water, would it be more permanent? Is there any valid objection to such modification of the formula?

Accepted by F. M. Harper, Madison, Ind.

6. When the green root of Cimicifuga is bruised and remains exposed to the air it emits a volatile body which, upon coming in contact with a glass rod moistened with Hydrochloric acid, gives white fumes, indicating Ammonia; what substance in the green root is the source of the exhalation?

Accepted by Professor E. S. Wayne, Cincinnati, Ohio.

7. What is Dextro-quinine? How is it made? What proportion of Quinia, Quinidia, Cinchonia, and Chinoidine does it contain? What is its proven therapeutic value?

Accepted by C. Gilbert Wheeler, Chicago, Ill.

8. The Alkaloid Berberina is by some writers claimed to be nearly insoluble, while others claim it to be freely soluble in water. The properties of the alkaloid should be further investigated.

Accepted by T. L. A. Greve, Cincinnati, Ohio.

9. Cologne Water is often prescribed. Should a formula be made officinal? And, if so, what formula is best adapted?

Accepted by Charles M. Miller, Mansfield, Ohio.

10. Fruit Syrups. An essay on them, with especial reference to their probable adoption in the next Pharmacopœia.

Accepted by Adolf G. Vogeler, Chicago, Ill.

11. Ointments. The consistence, keeping qualities, etc., of ointments made with lard, are often quite unsatisfactory. Some of the vegetable fixed oils, with wax or spermaceti, are said to produce a more satisfactory basis for ointments. Can such be advantageously substituted for lard in the officinal ointments?

Accepted by Prof. J. M. Good, St. Louis, Mo.

12. Rhamnus Purshiana has attracted considerable attention as a purgative remedy. What forms of galenical preparations of it are desirable, and how should they be prepared?

Accepted by George W. Kennedy, Pottsville, Pa.

13. Powdered extracts present some advantages at the dispensing counter. What solid extracts may advantageously be kept in that form and how are they best prepared?

Accepted by C. S. N. Hallberg, Chicago, Ill.

14. Medicinal Soaps are often found of very indifferent quality and composition. Cannot formulas be constructed whereby the officinal soap may be obtained advantageously of uniform quality and composition?

Accepted by George H. Schafer, Fort Madison, Iowa.

15. Peptonized Meat. Several methods for its preparation have been given. How may it be prepared so as to unite stability with medicinal usefulness?

Accepted by C. S. N. Hallberg, Chicago, Ill.

16. Aspidium Marginale has been found by Mr. C. H. Cressler to be very similar in its medicinal value to the European Aspidium filix mas. Can the rhizomes of the American plant be obtained in quantities, and if so, should the latter not be recognized by our Pharmacopœia in place of filix mas?

Accepted by George W. Kennedy, Pottsville, Pa.

17. Aromatic Spirit of Ammonia has been proposed as a menstruum for exhausting lupulin. Has this any advantage over alcohol?

Accepted by S. L. Coffin, Chicago, Ill.

18. Solvents for Wax, Paraffin, Stearin, Ceresin, as a test for adulteration of wax.

Accepted by P. W. Bedford, New York.

19. On dissolving solids in water, or in other liquids, a change of bulk is generally produced, consisting in nearly every case in an increase of volume. It is desired to work out a table of the changes of bulk produced by dissolving definite quantities of officinal solids in definite quantities of menstrua.

Accepted by P. C. Candidus, Mobile, Ala.

20. What are the advantages and objections to preparing *ferric hydrate* by the use of concentrated solutions of ammonia and ferric sulphate, as compared with the use of diluted solutions, with the special object of employing the ferric hydrate in making the scale salts of iron?

Accepted by Professor G. F. H. Markoe.

The Secretary exhibited a sample of salicylate of cinchonidia, prepared by Mr. F. H. Rosengarten, by the direct union of the acid and alkaloid. The salt crystallizes in prisms, is readily soluble in dilute alcohol, almost insoluble in cold water, and but slightly soluble in hot water.

Mr. Kennedy read the following report on the Centennial Fund:

INDIANAPOLIS, IND., September 12th, 1879.

The "Centennial Fund" Committee would respectfully submit the following report: Shortly after adjournment of last meeting the following was printed in red ink across the face of the old circulars of last year, there being some eight or nine hundred left, and a copy was inclosed with the Proceedings and sent to most of the members: "Only a little over one-fourth of the required amount having been contributed during the past year, the committee has asked for an extension of time in which to make up the requisite sum. The extension has been granted until the next annual meeting in September, 1879, by which time about three hundred and seventy-five dollars should be raised in order to permanently place the Association in possession of the 'Centennial Fund.' The committee, therefore, again appeal to all members to send a contribution, either large or small, to the chairman, at as early a date as may be convenient."

Statement of Fund.

Amount on hand at last report,	\$168 00
Received since, in answer to circulars, and collected at this meeting,	192 02
Total,	<u>\$355 02</u>

As we are still short \$169.98, and believing that the amount can be raised

by our next meeting, I would ask for an extension of time. The joint committee of druggists and pharmacists of Philadelphia are favorable to an extension.

GEORGE W. KENNEDY,
CHARLES A. TUFTS,
JOHN M. MAISCH,
Committee.

The report was accepted, and the committee continued for another year.

Mr. Wellcome showed a large number of implements in use by the Indian doctors of Peru, and gave an interesting account of their use, and of his observations made on the occasion of a recent visit to the West Coast of South America.

On motion of Professor Markoe a vote of thanks was tendered to Mr. Wellcome, and he was requested to write out his remarks for publication in the Proceedings.*

Professor Markoe gave an account of pharmaceutical matters in Chili. The remarks were listened to with marked interest, but the stenographer failed to report them.

Professor Garrison reported verbally on the exhibition, and on motion the committee were granted three weeks for finishing their report for publication.

Professor Markoe moved the following:

Resolved, That the thanks of the American Pharmaceutical Association be tendered to the several exhibitors who have added so much to the interest of this meeting by their extensive and valuable exhibits of chemicals, drugs, and other articles of interest and use in pharmacy.

The question was taken by Mr. Tufts and the resolution was adopted.

CHAIRMAN OF BUSINESS COMMITTEE.—Mr. President: we make a last call for any further papers or queries. If there are none, the committee will move that the Association now adjourn, after the reading of the minutes, to meet at Saratoga, N. Y., on the second Tuesday in September, 1880.

The motion prevailed.

The Secretary read the minutes of the present closing session, which were approved, and the President declared the meeting adjourned.

* This essay was lost in the mail, and could not be rewritten for this volume.—SECRETARY.

The following delegates to the twenty-seventh annual meeting became members of the Association by signing the constitution:

Oscar A. Beckman, Louisville, Ky.	Aug. Knœfel, New Albany, Ind.
William Blaikie, Utica, N. Y.	William S. Plumer, Jr., St. Louis, Mo.
J. G. Campbell, Corsicana, Texas.	H. H. Rademaker, Louisville, Ky.
Samuel L. Coffin, Chicago, Ill.	Fred. F. Reichenbach, St. Louis, Mo.
W. T. Courtney, Owensboro', Ky.	Henry P. Thorn, Medford, N. J.
Robert H. Cowdrey, Chicago, Ill.	Charles W. Tobey, Troy, Ohio.
Emanuel Goodman, Cincinnati, Ohio.	R. H. Venable, Bardstown, Ky.
Julius Jungmann, New York, N. Y.	O. S. Weusthoff, Dayton, Ohio.

JOHN M. MAISCH,
Permanent Secretary.

The druggists and pharmacists of Indianapolis organized in January, 1879, with the view of perfecting arrangements for the annual meeting. Through the Committee on Railroads, Mr. J. W. Bryan, chairman, considerable reductions of the fares were secured over all the railroads centring in Indianapolis, and over most of the Western and Southern lines, while all the great trunk lines east of the Alleghanies finally declined making a reduction.

The numerous lines running to Indianapolis operated somewhat against concentrating the visitors on their journey to the place of meeting, but from all the larger Western cities parties came, and increased in number on the way. From east of the Alleghanies a goodly number of members, with their ladies, met upon the train of the Pennsylvania Railroad which reached Pittsburg near midnight, September 6th, and mostly stopped there over Sunday, at the Seventh Avenue Hotel, embracing the opportunity of taking a view of the surroundings of the Iron City. On the way to Indianapolis, on Monday, they were joined by other members, and reached that city near midnight. During the same night and on the following morning most of the visitors arrived.

The Grand Hotel had been selected as the headquarters, and nothing was left undone by the hosts to make the stay of the visitors agreeable. The parlors of the Grand Hotel were thrown open on Tuesday night for a microscopical soirée tendered by the Microscopical Society, under the superintendence of Mr. Webster Butterfield, Esq. The majority of the instruments used on the occasion were of the manufacture of R. & J. Beck, London; but such made by Powell & Leland, and J. W. Sidle, and Zentmayer's histological microscopes, were also represented. The numerous objects comprised botanical, zoological, chemical, and mineralogical specimens, and microphotographs, many of them being of especial interest to the student of pharmacy and *matéria medica*.

On Wednesday afternoon the Local Committee conveyed the ladies and some of the members in carriages to the various points of interest about the city to which they had been invited. In the evening a complimentary vocal and instrumental concert was tendered to the Association at Mænnerchor Hall, by the Mænnerchor Society and Beissenherz's Military Band; and, after having

listened to the well-rendered music, many remained to participate in the hop which followed.

Messrs. Dickson, of the Opera House, had kindly placed at the disposal of the visiting members complimentary tickets, with reserved seat coupons, for witnessing the performance of the comic opera *Fatinitza*, by H. B. Mahn's company. Many availed themselves of this courtesy on Thursday evening, while others remained at the headquarters and indulged in the hop, which was continued until the time arrived for the grand banquet given by the druggists and pharmacists of Indianapolis to the visitors. After the repast, toasts were announced to the "American Pharmaceutical Association," the "American Medical Association," the "City of Indianapolis," the "Colleges of Pharmacy," the "Profession of Pharmacy," and the "Ladies," and were responded to by Mr. T. Roberts Baker, Dr. Theophilus Parvin, Hon. Thomas A. Hendricks, Professor Markoe, Mr. Joseph Roberts, and Mr. Joseph L. Lemberger. After the toasts the company again adjourned to the spacious parlors and corridors of the hotel, where dancing was continued to a late hour.

The large dining-hall of the Grand Hotel proved to be too small for the accommodation of all the guests at the banquet; a number of members improvised another banquet at the clubroom of the Circle House, and toasts and speeches were indulged in there likewise.

After the final adjournment on Friday, many visiting members were conducted to the industrial establishments, and other places of interest, in and around Indianapolis, previous to their departure from the city where they had enjoyed such unbounded hospitality.

Many of the visitors from the Atlantic States extended their trip to Cincinnati, St. Louis, or Chicago, and a number returned home by way of Niagara Falls; in all these places hospitably entertained by resident members.

JOHN M. MAISCH,
Secretary.

LIST OF COLLEGES AND ASSOCIATIONS

Having accredited Delegates to the Twenty-seventh Annual Meeting, with the Addresses of their Presidents and Secretaries.

COLLEGES OF PHARMACY.

	<i>President.</i>	<i>Secretary.</i>
California,		Emlen Painter.
Chicago,	C. Gilbert Wheeler,	S. L. Coffin.
Cincinnati,	John Weyer,	A. W. Bain.
Louisville,		F. C. Miller.
Maryland,	Joseph Roberts,	Edwin Eareckson.
Massachusetts,	Thomas L. Jenks,	Thomas Dollber.
New York,	Ewen McIntyre,	H. A. Cassebeer, Jr.
Ontario,		George Hodgetts.
Philadelphia,	Dillwyn Parrish,	William J. Jenks.
St. Louis,	George Ude,	E. P. Walsh.

STATE PHARMACEUTICAL ASSOCIATIONS.

	<i>President.</i>	<i>Secretary.</i>
Connecticut,	Hugh H. Osgood, Norwich,	Frederick Willcox, Waterbury.
Georgia,	John Ingalls, Macon,	W. A. Taylor, Atlanta.
Kentucky,	Vincent Davis, Louisville,	W. G. White, Richmond.
New Hampshire,	Brackett B. Weeks, Manchester,	G. F. Underhill, Concord.
New Jersey,	A. S. White, Mount Holly,	A. P. Brown, Camden.
New York,	P. W. Bedford, New York,	Charles H. Gaus, Albany.
Ohio,	J. F. Judge, Cincinnati,	L. C. Hopp, Cleveland.
Pennsylvania,	C. H. Heinisch, Lancaster,	J. A. Miller, M.D., Harrisburg.
South Carolina,	C. F. Paukniu, Charleston,	E. H. Kellers, M.D., Charleston.
Texas,	L. M. Connor, Dallas,	R. Voelcker, Galveston.

LOCAL PHARMACEUTICAL ASSOCIATIONS.

	<i>President.</i>	<i>Secretary.</i>
King's County, New York,	L. E. Nicot, Brooklyn,	E. A. Sayre, Brooklyn.
Richmond, Va.,	Hugh Blair,	T. R. Baker.
German Apothecaries, N. York,	Gustav Pfingsten,	L. G. W. Ruprecht.

ALUMNI ASSOCIATION OF COLLEGES OF PHARMACY.

	<i>President.</i>	<i>Secretary.</i>
Chicago,	F. G. Somers,	Andrew Scherer.
Cincinnati,		A. W. Bain.
Louisville,	B. Buckle, M.D.,	O. E. Mueller.
Massachusetts,		E. E. Bobb.
New York,	P. W. Bedford,	B. F. Hays.
Philadelphia,	W. E. Krewson,	F. M. Murray, M.D.
St. Louis,	J. W. Tomfahnde,	G. H. M. Goehring.

APPENDIX.*

A VISIT TO THE NATIVE CINCHONA FORESTS OF SOUTH AMERICA.

BY HENRY S. WELLCOME.

DURING the past year, while in South America, I visited some of the principal cinchona districts, and the following notes are based upon my personal observations, and information obtained from native bark dealers and gatherers.

The cinchona forests of Ecuador—of which I shall speak in particular—were, for many years, the only source from whence the world was supplied with barks; they still yield large quantities, and are being actively worked.

The bark-producing territory of Ecuador is divided into two general districts, known as Bosque de (forest of) Guaranda and Bosque de Loja.

The vast tract of wilderness extending from the boundary line of New Granada, about 1° north latitude, south to 2° south latitude, covers with its rich verdant mantle the western slope of the gigantic Chimborazo, and the outlying ranges of the Cordilleras, from the waters of the Pacific up to an altitude of over ten thousand feet, encompassing within its higher limits the picturesque city of Guaranda.† This district is now the source of the

* The cause of the delay in receiving the following paper has been explained on page 798.—SECRETARY.

† The first cinchona trees discovered within the Guaranda district were found near this city, hence the name of the forest.

larger portions of barks exported from Guayaquil;* many miles of its entangled forests have never yet been explored.†

The older cinchona district, known as Bosque de Loja, was the source of the first barks taken to Europe, or of which we have any authentic history. This district extends from 2° south latitude south to the boundary line of Peru, about 5° south latitude, and, like the Bosque de Guaranda covers the western slope of the Cordilleras below the timber line. The cinchona bark, with which the Countess of Chinchon,‡ wife of the Viceroy of Peru, was cured of fever, in about the year 1640, was collected near the town of Loja. Howard considers it well established that this bark was none other than the Royal Crown Loja quill.§ It is of interest, too, that the cure of the princess was probably due less to the alkaloid quinia than to the lower alkaloid cinchonidia, which predominates in that bark.|| The Loja forests still continue to furnish barks to the Guayaquil market; but there has been a gradual falling off in quantity during the past few years, which is not surprising considering that they have been worked constantly for over two hundred years, and been more thoroughly explored than any other forests of South America.

To reach the southern portion of the Bosque de Guaranda a small steam launch plies between the city of Guayaquil and Pueblo Nuevo, a small town about seventy-five miles distant, on one of

* Guayaquil, the main shipping port of Ecuador, is a city of 80,000 inhabitants, situated on the Guayaquil River, sixty miles from its mouth. The river is navigable to this point by large ocean steamers.

† The limits of these districts are not clearly defined, and can be stated as approximations only.

The northern portion of the Guaranda forest is also known as "Bosque de Esmeraldas," from the name of an adjacent seaport on the coast of Ecuador, from whence some barks from that portion of the district are exported.

‡ It is not known whether Linnæus corrupted purposely or by error, when he gave the name "cinchona" to the new genus (which he established for it) to commemorate the name of the Countess of Chinchon, through whose beneficent efforts the great remedy first became generally known in Europe.

§ From *Cinchona condamin*; grows to the height of eight to twenty feet, and at an altitude of 6000 to 9000 feet.

|| At that time the Royal Crown Barks were considered the finest quality, but have long since ceased to hold that regard; under the advanced knowledge of quinology analysis shows it to rank low in the yield of the alkaloid quinia. By cultivation, in the East Indies, it has been made to increase its percentage of the valuable alkaloids.

the eastern branches of the Guayaquil River. The trip is an exceedingly interesting one; hundreds of Indian canoes and balsa rafts* are met, laden with fish, vegetables, and fruit, for the Guayaquil market.

We passed innumerable little floating islands, covered with exuberant growths of aquatic plants. Loathsome alligators crawl up the river-banks and bask in the warm sun; great numbers of white herons flock along the shore. Here and there little hamlets of bamboo nestle in shady nooks, surrounded by groves of oranges, mangoes, and bananas.

Occasionally we are startled by the thundering boom of the ever-active volcano Saugay.† To the north, towering far above the clouds, we saw the lofty summit of Chimborazo, "grand monarch of the Andes," in all its resplendent glory; a dazzling pinnacle of everlasting snow, emblematical of a spotless purity, that presents a mocking contrast with the people who dwell upon its slopes, and call it their father. According to a legend cherished by the Chimbo Indians,‡ "many years ago their nation was founded by the great Chimbo razo (chimbo father); they prospered under his wise guidance, and became a powerful people, but finally the great father died and changed to the mountain of snow (Chimborazo), that he might furnish his children with water to drink. But on the very day that the mighty Inca nation§ conquered them, Chimborazo was so stricken with grief that his head fell off." An irregular spur, jutting out from the north side of the mountain just above the snow-line, is pointed out as being his head.

Arriving at Pueblo Nuevo peons|| and beasts are engaged and equipped for the journey, on muleback, or, as sometimes face-

* Balsa rafts are made by lashing together with bejucos the trunks of a tree called balsa palma; they are as light as cork, and exceedingly buoyant. Rigged with masts and sails these craft cruise along the coast, and sometimes venture well out to sea.

† The volcano Saugay was active at the time of the Spanish conquest, and has been in constant eruption ever since. It discharges every thirty or forty minutes; the explosions are often heard in Guayaquil, over one hundred miles distant, and her ashes fall in the streets.

‡ The descendants of the Chimbos now live in the Valley of Chimbo, on the western slope of Mount Chimborazo.

§ The ancient Peruvians found in possession of the country at the time of the conquest by Pizarro.

|| Peon, an Indian servant, laborer, or slave.

tiously termed, "on the hurricane deck of a mule." All travel and transportation must be done on the backs of beasts or Indians, as wheeled vehicles are useless for want of roads. In the higher altitudes, llamas serve as beasts of burden, and in the valleys of Quito and Riobamba I have seen sheep, goats, and cattle used for the same purpose.

From Pueblo Nuevo extends a few miles of the narrow gauge railroad* constructed under the administration of the late President Garcia Moreno. It was his greatest ambition to open to the outside world the glories of the higher Andes. But shortly after the road was begun an assassin's knife checked his energetic and enterprising career.

The trail through the forest is simply a rough bridle-path, worn by years of travel, though not improved by use, sometimes leading us through low marshy places of nearly bottomless mire, where the beasts floundered about, sinking deeper and deeper, until they and ourselves were nearly submerged. Proceeding to the interior the forest growths show greater exuberance; the trees are so netted with vines, creepers, and trailing lianas, and the foliage so closely woven together, as to present almost impenetrable walls on either side of the way, draped with rich verdure, while leaves of bright and varying tints light up and relieve the sombre shades.

The many beautiful flowers attract and please, but do not so deeply impress and charm one as does the gorgeous foliage, in which nature has so lavishly grouped the choicest gems and wrought such perfect harmony in her infinite variety of elaborate designs and rich colorings.

Before reaching the highlands we passed through forests of the ivory-nut palms, with their long, graceful, feather-like branches, and a few scattering trees of *cinchona magnifolia* (a valueless variety), are met with.

Occasionally we found clearings, with extensive haciendas of cacao, coffee, sugar-cane and annatto, and halted for the night at one of these estates. The huts are constructed of bamboo, and erected on stilts, to prevent the entrance of animals and reptiles, as also for safety in time of floods, which frequently occur during

* A German engineer has recently contracted with the Ecuadorian Government to extend the road to Quito, but considering the present financial condition of the country, the realization of such a stupendous feat of engineering in our day is extremely doubtful.

the wet season.* The house-furnishing is very simple; neither chairs, tables, beds, or stoves are found in these huts; fire is used for cooking only, and is prepared on a flat rock, or on the ground. The fare is quite as meagre; our bill consisted of calde, locro, and roasted plantain. Calde is their most substantial dish; it is prepared by boiling together—in something like the style of an Irish stew—the tough rank meat of a gaunt black pig of the country, with potatoes,† onions, garlic, and Chili peppers. Locro is a peculiar mushy soup, made by boiling potatoes and eggs together with various condiments. Plantains are roasted by burying them in hot coals and ashes before removing the peel.

Food is served in a rough carved bowl of wood, or calabash; the liquid portion taken with a wooden spoon, and the solids fished out with the fingers.

The natives in these forests do not burden themselves with extensive wardrobes. The young, under fifteen years of age, often appear in the innocence of perfect nakedness.

There is something peculiarly fascinating about the careless simplicity of these people, their procrastinating manner of life, and romantic surroundings.

In the place of beds we found repose upon the floor; but the nights at the equator are too delightful for sleep; the skies are so clear and transparent that one can seem to peer into the remotest depths of space, and, verily, to view the realms of Deity. Nothing can surpass the enchanting splendors of the tropical skies; the stars shine out in the great azure dome with a brilliancy unknown in our northern climes, while myriads of more distant luminaries cluster like clouds in the background.

We miss the Dipper of the constellation of the Great Bear, but are amply repaid by a view of the Southern Cross in its stead.

The bright moon and starlight penetrating the mingled foliage of the lofty forest trees produce mystic shadows, delineating divers grotesque, unearthly forms, and adding to the weirdness of our surroundings; the lightning-beetle‡ flashes out a vivid gleam

* The wet season, called "invierno," lasts from December until May; during those months frequent heavy rains occur, and, together with the melting of snow on the high mountain-peaks, produce furious floods.

† Potatoes were first introduced into Europe from Ecuador.

‡ *Pynophorus noctilucis*. In the evening these beetles are worn as jewelry by the native women, and with very charming effect. The insect is attached to the clothing by means of a sort of harness of thread. The light

of greenish-yellow light, that, to the brilliancy of a diamond, is like contrasting the electric light to a tallow dip.

Balmy, zephyr-like breezes gently fanned us into such a dreamy fanciful mood that we could easily have imagined ourselves transported to a fairy-land, were it not for the ravenous onslaughts of cannibalistic fleas and mosquitos, forcibly reminding us that we were yet beings of flesh and blood.

At midnight the temperature fell to about 50° F., and a damp clammy chill came over us, making us wrap more closely in our blankets.

After continuing our journey for some distance into the foothills, we left the regular trail and struck into a newly cleared way to the north, keeping our peons ahead, with machetes* in hand, to cut away the bejucos† which hang in loops that threaten to catch beneath the chin and jerk one from his beast. Very strong clothing is required in travelling through these forests, for the many hooked branches play havoc with one's habit, and often cut ugly flesh-wounds.

In crossing the rivers a tree felled across, from bank to bank, served as a foot-bridge, over which we passed, while our mules were made to swim; it is not without considerable danger that these crossings are made, and frequently serious accidents occur.

In some of the more travelled Andean trails, where the banks are very high and abrupt, the rivers are crossed by hammock or swinging bridges, made of bejucos. The small mountain-streams are usually forded; frequently we follow up their banks, recrossing sometimes half a dozen times within a mile.

The cheery, musical ripple and murmur of those crystal clear waters, breaking over the numerous rocky declivities, which form an almost continuous array of rapids, with now and then furious cascades, produce a most grand and striking contrast with the sombre silence of those majestic forests.

I was greatly disappointed on entering for the first time a tropical forest at midday, by the almost oppressive silence that prevailed, and apparent want of animal life. Occasionally we

proceeds from two small lobes on the thorax; they continually dim and again intensify the glow of these little lanterns, producing a peculiar wavering brilliancy that is quite dazzling.

* The machete is a large heavy knife carried by the natives; it has a blade fifteen to twenty-five inches in length.

† Bejucos, a name applied to all woody climbing vines.

heard the zip of a humming-bird, and traced, like a flash, the glitter of its brilliant plumage in the sunlight as, for a moment, it darted from one flower to another, then, fairylike, disappearing in an instant.

Great numbers of beautiful butterflies floated silently past, waving their banner-like wings, so resplendent with lustrous hues.

Now and then a reptile glided across our pathway, and a gang of monkeys, taking fright at our approach, would scramble away into the tops of the higher trees.

Little else of animal life was seen during the day, but at twilight and in early morning the whole forest seemed to be alive; above all, in the hubbub of unearthly noises, could be distinguished the shrill screeches of the macaws, toucans, and parrots, and the yelling or howling of monkeys.

Little music could be found in all these discordant sounds. It is remarkable that among the many tropical birds of gay plumage there are very few sweet songsters; their notes are nearly always harsh and shrill.

Getting fairly into the mountains the difficulties and dangers increase; zigzagging up almost vertical cliffs, only to find steep descents, and descending to climb again. In these mountains it is necessary to trust entirely to the mules.* Often having to go through narrow passageways, between huge boulders, dodging projecting rocks, then winding our way around the mountain-sides in narrow grooves, barely wide enough for the beasts to gain a footing, sometimes along the verge of frightful precipices of several hundred to a thousand or more feet. In some of the older trails there can be seen in the far depths of the chasms below whitened skeletons of human beings and mules, and now and then ghastly human skulls are found placed in niches cut into the bank along the passage, invariably with a cross above them, being tenderly suggestive of lurking dangers. Words are inadequate to picture the terribly broken and precipitous character of these Andean ranges; on every side traces of eruptive violence are distinctly visible; every rock shows the marks of a tremendous crushing force; the irregular masses of rock and earth heaped together form tortuous ridges and bold craggy spurs, with numerous intersecting fissures, ravines, and vast chasms; every

* The sagacity of a mule is truly wonderful. They are the only safe animals for travelling in these mountains. They are far preferable to donkeys.

physical feature is modelled on a scale of magnificence and grandeur. Towering proudly above the Guaranda and Loja cinchona districts, and grouped within a radius of one hundred miles, are the lofty trachyte and porphyritic peaks of more than twenty volcanoes,* four of which are now active. Ecuador is a very hot-bed of eruptive elements; she is frequently convulsed by earthquakes, and at irregular intervals her volcanoes break forth with terrific fury, belching their fires high into the heavens, ejecting volumes of molten lava, and devastating the surrounding country with showers of stones, ashes, and mud.

It must have caused our planet to quake to its very centre when nature's mighty convulsive forces burst their subterranean bonds, upheaving, rending, and fragmenting the earth's surface, forming midst that awful chaotic tumult these vast Cordilleras, with summits so near to heaven that they will never be defiled by the footprints of mankind.

In many places, while penetrating the forests, we were obliged to dismount and climb, while our mules were lifted almost bodily up the jagged steeps by the peons; but finally we reached a point beyond which it was impossible to take the animals. Leaving them in charge of a peon, we proceeded on foot, picking our way through the blind mazes of dense jungle, clambering over the decaying trunks of fallen trees, continually ascending and descending steep places until we gained a point on one of the great spurs, where we saw spread out before us a boundless undulating sea of wilderness, as far as the eye could reach, a gorgeous expanse of matted verdure, illumined by showy blossoms of glowing colors; here and there tall slender columns of the palms pierced the forest roof, and gracefully waved aloft their drooping feathery branches.

The surpassing grandeur of this view was enrapturing beyond expression. On every hand the manifold and varied beauties unfolded themselves with almost bewildering rapidity; but suddenly a huge bank of clouds drifted upon us like a Newfoundland fog, curtaining the scene for a few moments, and then quickly passing off.

Our cascarillero† soon descried some cinchonas in the distance, by the glistening leaves, which reflected brightly the vertical rays of the sun.

* Many of these volcanoes are continually mantled with snow.

† The bark-collectors are called cascarilleros.

This characteristic reflex of the foliage, together with the bright roseate tints of the flowers, afford the means of discovering the cinchonas among this mass of forest giants. In prospecting by the appearance of the leaves alone a novice is easily misled by the india-rubber tree, which has a glossy leaf very like the magnolias of our Southern States, and when seen at a distance reflecting the bright sunlight is easily mistaken for the cinchona.

Our cascarillero led us down a steep, slippery bank, formed of a reddish-yellow micaceous clay, which yielded like grease beneath our feet; we were obliged to cling to vines and limbs for support, as every few steps rocks would detach, and fly crashing through the thickets below.

Finally reaching the bottom of the ravine we followed the sinuous course of a small stream until suddenly our guide shouted "Cascarilla!*" and we were gladdened by the sight of several fair-sized trees of *Cinchona succirubra* on a slope near by.

The older cinchona tree, as found in their virgin forests, are really very grand and handsome.

The cinchonas appear to seek the most secluded and inaccessible depths of the forests for their habitation. They are rarely grouped in large numbers, or close together, but are distributed in more or less irregular, scattering patches; sometimes single trees are found, widely separated from any others of its family; variety and diversity are notable features of tropical forests.†

The *Cinchona succirubra* ranges from forty to eighty feet in height, trunk straight, and branches regular; leaves opposite, evergreen, broadly oval, six to ten inches in length, of a rich dark-green color, sometimes tinged with crimson,‡ the upper surface of an almost waxy lustre, pubescent beneath, finely veined, midrib decided and strong.

The flowers§ have a five toothed, superior calyx, and tubular corolla, are arranged in terminal panicles of bright-rose tint, and diffuse a pleasing fragrance.

* Cascarilla is the Spanish word for bark.

† Agassiz once in Brazil counted over one hundred different varieties of trees within an area of half a mile.

‡ The leaves of *Cinchona succirubra* show more red than any other variety. It is due to the larger amount of cinchotannic acid present.

§ At the time of my visit (month of June) none of the cinchonas were yet in blossom.

The capsules are ovoid, and contain thirty to forty flattened seeds, winged all around by a broad membrane, irregularly toothed, and lacerated at the margin.

The bark of the large trees is usually completely covered and fringed with mosses of the most delicate lacelike texture, interspersed with lustrous variegated lichens, and prettily marked diminutive trailing ferns.

Air plants and vines in profusion entwine themselves among the branches, and hang in graceful festoons, forming hammocks, in which cluster an abundance of parasitic growths, particularly of the orchid family; these plants cling to every limb and vine, flourishing in their fullest splendor, exhibiting many remarkable phenomena in their curious mimicry of insect and animal forms.* Vegetable growths develop with wonderful luxuriance beneath the almost dismal shades of the closely interlacing branches, which permit but the faintest rays of sunlight to ever filter through their rich leafy drapery; everything saturated and dripping with moisture, the very air we breathed seemed a clammy vapor. In these forests the atmospheric changes are continuous and very abrupt; drifting banks of gloomy clouds are followed by glaring sunshine, and then tempestuous showers, all in rapid succession.

The temperature is more even, averaging about 65° F., seldom exceeds 80° F., and very rarely falls below 45° F.† As stated above the reflection of the shining leaves, and the bright, showy color of the flowers, afford the means of discovering the cinchona trees. When the cascarilleros enter the forests to prospect‡ for cinchona patches they ascend to such high spurs as command a good view of the surrounding valleys and mountain slopes. Skilled cascarilleros can determine very accurately a paying forest at a great distance, and are usually able to distinguish the varieties by the color of the flowers and general appearance of the tree. After discovering a forest that indicates sufficient value to render it profitable to work, a certain limit§ of forest land is condemned and a claim made to the government; upon the payment of a

* The Indians hold some varieties of the orchids in superstitious regard, on account of the peculiar forms they assume, notably among which is the flower of the Holy Spirit, which appears the very prototype of a dove.

† Altitude about 6000 feet.

‡ The term prospect is used in the same sense as in the search for mines.

§ The boundary is usually indicated by certain mountains, valleys, or streams.

certain fee a title* is granted. These claims are christened usually with some sacred name, such as Bosque de San Miguel, or Bosque de Sacramento.† As a rule the bark-gatherers are of that happy-go-lucky sort,—very much like our Western miners,‡—inveterate gamblers, and while they have money dispense it freely, consequently are “dead-broke” every year long before the bark harvest begins.

After discovering a new forest and securing it with a government title, the cascarillero applies to a bark-dealer for funds with which to work his claim; if he can present satisfactory evidence that his forest is a profitable one, sufficient money is usually advanced to work it, the title being held by the merchant as security, and with it an agreement that the bark shall be delivered and sold to him exclusively.§ Sometimes the dealers purchase claims outright and employ men to work them.

The season for bark-gathering begins about the 1st of August and lasts until October or November;|| during these months the bark cleaves most readily, and the forests are more easily accessible.¶ A master cascarillero with his gang of peons** enters the forest, and first establishes a main camp, with bamboo huts for habitation and for sheltering the bark. These camps are located near a spring or river and on an elevated point where there is an opening in the forest, so as to allow the bark as much exposure as possible. Sufficient supply of provisions is taken into the forest to last during the season.††

The peons are formed into squads, each division being placed in

* These titles are granted on very much the same plan as those upon mining claims in the United States.

† These claims are each called bosques (forests).

‡ Only they lack the energy of our miners.

§ For many years the bark trade of Bolivia was monopolized by the government; the cascarilleros were obliged to sell their bark to a bank established for that purpose, and receive for it whatever price the officials chose to pay. This system was conducted with such flagrant injustice and dishonesty that it was finally broken up. Now each of the republics levies a duty on all barks exported.

|| In some forests the season begins as early as June.

¶ Because of less rainfall during the summer; it is almost impossible to enter the forests during the wet season.

** Sometimes as many as three or four hundred.

†† In the older forests potatoes and plantains are grown near the main camp.

charge of a jefe,* who is held responsible for his subordinates. These squads scatter through the forest and establish small camps; when they get fairly settled the bark-gathering begins; one or two from each division seek out the trees, while others cut down† and peel them. The trees are first decorticated from the ground up as far as can be reached, and then, after felling and removing the clinging vines and mosses, the rough outer bark is beaten off with a club or mallet. The bark is then cut around the trunk in sections of two to three feet, and longitudinally in strips of six to eight inches in width, then removed with the blade of a machete. The root-bark is obtained by digging away the earth and cleaving with a machete (the pieces are very rough and irregular).

When first taken from the tree the inner surface of cinchona bark shows a handsome cream tint (with juice of the same color), but on exposure to the atmosphere rapidly darkens to a dirty red. The blade of a new sheath-knife with which I cleaved some bark of *Cinchona succirubra*, was stained a beautiful purple color wherever it was touched by the juice.‡

The barks are usually taken to the main camp for drying and storage.

The thick bark of the trunk requires great care in drying because of the excessive dampness of the atmosphere, which sometimes necessitates the use of artificial heat to prevent moulding; it is piled up in tiers with sticks between the layers to allow free circulation of air, and weights are placed on top to flatten it.§ The thin bark from the young trees and small limbs dries more readily and rolls itself up into quills.||

One of the greatest difficulties connected with the gathering of cinchona bark is that of transporting it to the coast at the end of the season. It is roughly sorted, according to the part of the

* Jefe,—pronounced *hefa*,—meaning chief, and sometimes called major-domo. Each squad is allowed to elect its own jefe; the qualifications required for gaining such distinction among their fellows is bravery and superior muscular power.

† The axes used for cutting down the trees are something of the broad-axe pattern, and are of American manufacture. American edged-tools of all kinds receive preference in those countries.

‡ Caused by the action of cinchotannic acid upon the steel.

§ This forms what is known as flat barks,—called by the natives *tabla* (which signifies flat).

|| Called by the natives *canulon*, which means a tube or pipe.

tree from which it is obtained, and packed in bales of about one hundred and fifty pounds each; the Indians carry these bales on their backs a distance of sometimes several hundred miles to a transfer warehouse, from whence it can be transported by mules to the nearest seaport.*

The Indians bear the main weight of the burden upon their heads, by placing over the forehead a strip of rawhide to which are attached cords of the same material lashed to the bale. They stoop forward to maintain their equilibrium, and use long Alpine staffs to steady and aid them in ascending the dangerous cliffs. The skeletons of hundreds of wretched peons now lie bleaching beneath the tropical sun; their earthly toils having been ended by a misstep on the verge of a precipice, or by falling victims to the deadly fevers while bearing upon their backs the very specific intended for the relief of the sick in distant lands.

An old Indian while relating to me the dangers encountered in collecting cinchona bark, said that at the time of the Spanish conquest his people were robbed of their possessions, had since then served as slaves, and are now made human sacrifices to furnish health to the white foreigners.

The malaria in some of the forest valleys is simply fearful, and owing to great exposure and want of nutritious food the Indians yield very quickly to its influence.

I was told by a bark merchant that during a severe malarial season, several years since, as many as twenty-five per cent. of the Indians employed in one district died from fevers before the harvest was completed.

Malarial fevers are regarded with great terror by the Indians, and it is only by extreme poverty, or obligation as peons, that they are induced to enter the bark forests to encounter the dangers for the meagre pittance of ten to twenty-five cents per day.

The final sorting and classifying of barks is done at the main bodegas† at the coast,‡ where it is packed in ceroons of cowhide,§

* The worn appearance of most cinchona barks seen in the market is produced by the rough handling it gets during transportation to the coast.

† Storehouse.

‡ In Bolivia the sorting and packing is usually done before transporting to the coast.

§ The ceroon consists of a closely packed bale sewed up in cowhide (hair side out). The hide having first been rendered soft and elastic by soaking in water, on drying it shrinks and forms a very strong and firm package.

or bales of heavy sacking; there it is that most of the adulteration and sophistication is done. The admixture of inferior barks with higher grades is not so much the result of ignorance as has been supposed by many, for the bark dealers are very expert in determining the different varieties and estimating the values of barks; but, strange to say, very few bark merchants ever become wealthy.

All barks enter the market bearing certain brands, such as "J. P.," or "T. B." These brands gain a reputation according to the quality of bark they represent, but it is sometimes the case that as soon as a brand has established a good name the dealer sophisticates with inferior grades.* No large buyers of Europe or America purchase cinchona barks without first making careful assays; but, even with this precaution, they are sometimes deceived, on account of the adroit manner in which the barks are mixed.

The points of shipment for Ecuadorian barks are Guayaquil and Esmeraldes; for the barks of Northern Peru, Payta; from Southern Peru and Bolivia, Arica, Islay, Iquiqui, and Callao. A limited quantity of Bolivian bark is exported by way of the Amazon to Para.

The greater portion of the bark produced in the northern and eastern districts of the United States of Colombia reach the market by way of Carthagena and Barranquilla, on the Caribbean coast, but that collected in the State of New Grenada is mostly shipped from Buenaventura on the Pacific coast.

Venezuela furnishes very little bark,† and that is sent from Puerto Cabello.

As regards the prospects for future supplies of cinchona barks from the native forests of South America, the outlook is exceedingly discouraging; the greatly increased use of cinchona alkaloids during the past few years, with the consequent demand for larger supplies of bark, has caused a very thorough working of the old forests, and energetic seeking for new ones. The discoveries of paying forests are becoming more and more rare every year,

* I was told of one merchant who, thinking his brand sufficiently well established, made a very large shipment of high-grade bark, with which he mixed about one-third of inferior quality; but the trick was detected in the foreign market, and his entire lot could only be sold as inferior grade, causing a heavy loss and serving him a very just punishment.

† The tapering-off points of the Andes, as also of the cinchona-producing forests, are in Venezuela.

and the new forests are found at greater distances from the shipping ports, and more difficult of access.

The tract of country yielding the cinchona is not so unlimited as some writers would lead us to believe, nor is the supply inexhaustible; it is a fact recognized by natives and dealers, who are well informed about the extent and resources of the cinchona-bearing districts, that if the present ruinous system of destroying the trees is continued, and no effort made to propagate new growths, they will, before many years, be practically exterminated from their native soil.

With the abundance of seeds yielded by the cinchonas one would naturally expect young plants to spring up in great numbers, but such is not the case; the light-winged seeds mostly fall upon and adhere to the ever-moist foliage, where they quickly germinate and decay; or, if, perchance, they fall to the earth, it is almost impossible to gain a rooting, as the soil is covered to the depth of ten to twenty inches with loose decaying leaves. Beyond all doubt the cinchonas might be successfully cultivated in their native country, especially in the localities of the exhausted forests; but the natives show no enterprise, and foreigners receive no encouragement from the government to attempt it.*

Two Germans have made a venture at cultivating cinchonas near the city of La Paz, Bolivia, but as yet the plants are not sufficiently developed to determine the results.

The almost continuous revolutions and wars in those South American countries so unsettle everything as to render investments hazardous; the roads and ports are sometimes blockaded for months, preventing the importation of goods or shipment of barks, often entailing heavy losses upon the dealers.†

In case of war or revolution every Indian peon is subject to military duty, and if required is forced to enter the army; sometimes it is impossible to obtain sufficient cascarilleros to make it pay to enter the forests; hence it is, that political troubles in those countries so greatly influence the price of bark and quinine.

We have no reliable history of the discovery of the medicinal

* The Dutch and British governments have shown great wisdom in taking such energetic measures to insure against the possibility of the world's bark supply becoming exhausted, and happily their experiments in their Eastern plantations are proving successful.

† During a revolution the property of any person suspected of sympathizing with a rival party is liable to be confiscated.

virtues of cinchona bark, and the question as to whether or not its therapeutic value was known to the Indians before the Spanish conquest is still a subject of controversy. Of the several legends extant regarding its discovery and early history, one is of a certain saint who saved the life of a very holy padre* by divulging to him the medical virtues of cinchona; this is told with several variations. The version which savors most of reality is that a padre was cured of fever at a small village, near Loja, by a decoction of cinchona bark administered to him by an Indian cacique.†

A legend which has gained wider circulation—probably on account of its romantic character—is that while a body of Spanish soldiers‡ was passing through the forests, one of their number was attacked by fever and left by the way to die. To quench his thirst he drank from a pool of water in which grew a cinchona tree; very soon he recovered and joined his comrades, heralding his salvador.§

The Spanish priests endeavored to destroy every relic of native civilization, giving as little credit as possible for the many valuable products which they obtained from the people whom they reduced from wealth and thrift to the most degrading serfdom; defiling their magnificent temples of worship, and forcing|| upon them a form of religion¶ which, to this day, they observe only as a ceremonial performance, hedged about, as it is, by superstition and ignorance.**

It was the policy of the conquistadors to appropriate to themselves†† all creditable things. This is, undoubtedly, the reason why we have no authentic history of the medicinal use of cin-

* Jesuit priest.

† Priest of the worshippers of the sun.

‡ After or about the time of the conquest of Peru.

§ This legend is especially commended to the credulity of believers in high dilution.

|| By establishing the Inquisition.

¶ With all respect to the religion of Christ and its redeeming qualities.

** It is told that a party of priests, borne on the backs of Indians, went as missionaries among the Napa Indians (a tribe that had never acknowledged the authority of the Spanish invaders), soliciting them to accept the religion of the cross, like the other nations (who after the fall of Atahualpa humbly accepted the yoke of oppression); but the heathen, shaking their heads and laughing with derision, said (pointing to the slaves bearing the Jesuit fathers), "and carry you on our backs? Oh, no. We don't want a god that will transform us into beasts. Our god is the sun; he smiles upon us, gives light, and makes men of us, not dogs."

†† It was first introduced into Europe under the name of Jesuits' bark.

chona by the natives at the time of the invasion. It may be that its use was not general among all the Indian tribes, as the forests of Ecuador and Northern Peru* were the only sources from whence bark was collected by the Spaniards for nearly a century after it was introduced into Europe. However, this may be attributable to the fact that the Indians were (and they are now) very secret about the source of their remedies.

Several eminent travellers state (from hearsay I suspect) that the Indians could not be induced to take cinchona bark as a medicine, and that they would not believe it was sought by foreigners for other than dyeing purposes. If this be true, how is it that the term applied to cinchona bark by the Indians is *quinia-quinia*, which signifies medicine bark? Herndon and Gibbons state that the Indians of the Matto-Grosso country use an infusion of red cinchona bark, which they deem a very efficacious remedy for *calenturas*.†

Ecuadorian Indians told me that they regarded it a specific for fevers.

I was informed that pieces of the bark had been discovered in some of the ancient tombs; but I was unable to have this verified by positive proof.‡ It is very probable that such relics have been found, as I obtained specimens of *erythoxylon coca* leaf§ from the old Inca tombs in Peru.

It is a general belief among the natives that cinchona bark was well known and highly regarded as a remedy by their ancestors long before the Spaniards, under the daring Pizarro, invaded their coast.

* At the time of the conquest the whole of Western and Northern South America was known as Peru; hence the name Peruvian bark.

† Fevers.

‡ Experience teaches one to receive all statements made by the natives with due allowance.

§ Coca was cultivated and used by the natives throughout the country; it is still cultivated, but its use is not so general as before the conquest; more is consumed in Bolivia than elsewhere.

LIST OF PUBLICATIONS RECEIVED

For the American Pharmaceutical Association.

Societies and editors are respectfully requested to forward all publications intended for the American Pharmaceutical Association to the Permanent Secretary. European exchanges, if not sent by mail, will reach us through the Smithsonian Institution at Washington.

JOHN M. MAISCH,
145 North Tenth Street, Philadelphia, Pa.

- The Druggists' Circular, New York, 1879.
New Remedies, New York, 1879.
Oil, Paint, and Drug Reporter, New York, 1879.
American Journal of Medical Sciences, Philadelphia, 1879.
Medical News and Library, Philadelphia, 1879.
The Pharmacist, Chicago, 1879.
Pacific Medical and Surgical Journal, San Francisco, 1879.
The Canadian Pharmaceutical Journal. Edited by E. B. Shuttleworth, 1879.
Pharmaceutical Journal and Transactions, London, November, 1878, to December, 1879.
Calendar of the Pharmaceutical Society of Great Britain, 1880.
Yearbook of Pharmacy and Transactions of the British Pharmaceutical Conference, 1879.
The Chemist and Druggist, London, 1879.
The Chemists and Druggists' Diary, 1880.
Proceedings of the Philosophical Society of Glasgow, XI, No. 2.
Pharmaceutische Zeitschrift für Russland, 1879, Nos. 2-16.
Sitzungsberichte der K. Bayer. Akademie der Wissenschaften, 1878, 1-4.
Die Chemische Synthese. Von Dr. Adolf Bæyer, 1878.
Sur la Solubilité des Calculs Urinaires. Par H. P. Madsen, 1879.
Transactions of the American Medical Association, 1879.
Nachrichten von der K. Gesellschaft der Wissenschaften, etc. Göttingen, 1878.
Pharmaceutische Centralhalle, 1879.
Archiv der Pharmacie, Halle, 1879.
Zeitschrift des allgemeinen oesterreichischen Apotheker-Vereines. Wien, 1879.
Anzeiger der K. K. Akademie der Wissenschaften. Wien, 1879.
Schweizerische Wochenschrift für Pharmacie, 1879.
Proceedings of the American Academy of Arts and Sciences, Boston, XIV.
Transactions of the Illinois State Medical Society, 1878. Twenty-eighth Annual Session. N. S. Davis, M.D., Secretary, Chicago.

Proceedings of the Connecticut Medical Society, 1879. C. W. Chamberlain, M.D., Secretary, Hartford.

Transactions of the South Carolina Medical Association, 1879. H. D. Fraser, M.D., Secretary, Charleston.

Transactions of the Minnesota State Medical Society, 1879. C. H. Boardman, M.D., Secretary, St. Paul.

The Medical and Surgical History of the War of the Rebellion. Part II, Vol. I. Washington, 1879.

Annual Report of the Mercantile Library Company of Philadelphia, 1879.

Annual Report of the Trustees of the Astor Library Company of the City of New York, 1878.

Calendar of the University of Michigan for 1879.

Annual Report of the St. Louis Public School Library, 1879.

Annual Report of the President to the Corporation of Brown University, 1879.

Catalogue of the University of Vermont and State Agricultural College.

First Annual Report of the State Board of Health of the State of Connecticut. Hartford, 1879.

Thirty-sixth Annual Report of the Managers of the State Lunatic Asylum, Utica, New York.

Journal of the Cincinnati Society of Natural History, Vol. I, 1, 4.

Report of the Regents of the University of the State of New York, 1875, 1876, 1877, 1878.

LIST OF SOCIETIES, LIBRARIES, JOURNALS, AND INDIVIDUALS,

To whom Complimentary Copies of the Proceedings of this Association are forwarded.

The State Libraries of all the States of the Union except Connecticut.		
Maine Pharmaceutical Association,	Portland,	Maine.
Bowdoin College,	Brunswick,	"
Dartmouth College,	Hanover,	New Hampshire.
New Hampshire Medical College Society, Dr.		
G. P. Conu, Secretary,	Concord,	"
Amherst College,	Amherst,	Massachusetts.
Harvard University,	Cambridge,	"
Massachusetts College of Pharmacy,	Boston,	"
American Academy of Arts and Sciences,	"	"
Medical Library Association,	"	"
City Library,	"	"
City Hospital,	"	"
Massachusetts General Hospital,	"	"
Boston Athenæum,	"	"
Vermont Pharmaceutical Association,	Vermont.	
University of Vermont,	Burlington,	"
Brown University,	Providence,	Rhode Island.
Trinity College,	Hartford,	Connecticut.
Medical Journal and Library Association,	"	"
Connecticut Medical Society, C. W. Chamberlain, M.D.,		
	Haverford,	"
Silas Bronson Library,	Waterbury,	"
Yale College,	New Haven,	"
College of Pharmacy of the City of New York, New York, New York.		
Literary and Scientific Society of German		
Apothecaries,	"	"
Druggists' Circular,	"	"
New Remedies,	"	"
Oil, Paint, and Drug Reporter,	"	"
Astor Library,	"	"
Mercantile Library,	"	"
Long Island Historical Society,	Brooklyn,	"
Camden County Pharmaceutical Association,	Camden,	New Jersey.
New Jersey State Lunatic Asylum,	Trenton,	New Jersey.

834 SOCIETIES TO WHOM PROCEEDINGS ARE FORWARDED.

Philadelphia College of Pharmacy,	Philadelphia, Pennsylvania.
College of Physicians,	" "
Pennsylvania Hospital,	" "
Academy of Natural Sciences,	" "
American Philosophical Society,	" "
Philadelphia Library,	" "
Mercantile Library,	" "
American Journal of Medical Sciences,	" "
Medical Society of the State of Pennsylvania,	" "
Pittsburg College of Pharmacy,	Pittsburg, "
Maryland College of Pharmacy,	Baltimore, Maryland.
University of Maryland,	" "
Maryland Academy of Sciences,	" "
Smithsonian Institution,	Washington, Dist. Columbia.
Congressional Library,	" "
Surgeon-General United States Army,	" "
Surgeon-General United States Marine Hospital	
Service,	" "
Surgeon-General United States Navy,	" "
Bureau of Education,	" "
Department of Agriculture,	" "
United States Patent Office,	" "
National College of Pharmacy,	" "
Library of the American Medical Association,	" "
Medical Society of the District of Columbia,	" "
Richmond Pharmaceutical Association,	Richmond, Virginia.
Medical Society of Virginia, L. B. Edwards,	
M.D., Secretary,	" "
South Carolina Medical Association, Dr. H. D.	
Fraser, Secretary,	Charleston, South Carolina.
Tennessee College of Pharmacy,	Nashville, Tennessee.
Louisville College of Pharmacy,	Louisville, Kentucky.
Cincinnati College of Pharmacy,	Cincinnati, Ohio.
Cincinnati Academy of Medicine,	" "
Mussey Medical Library,	" "
Longview Asylum,	Carthage, Hamilton Co., O.
University of Michigan,	Ann Arbor, Michigan.
Chicago College of Pharmacy,	Chicago, Illinois.
Illinois State Medical Society,	" "
St. Louis College of Pharmacy,	St. Louis, Missouri.
St. Louis Academy of Science,	" "
St. Louis Mercantile Library,	" "
St. Louis Public School Library,	" "
Kansas State University,	Lawrence, Kansas.
Minnesota State Medical Society, C. H. Board-	
man, M.D, Secretary,	St. Paul, Minnesota.
California Pharmaceutical Society,	San Francisco, California.
Pacific Medical and Surgical Journal,	" "

Montreal College of Pharmacy, Montreal, Canada.
 Ontario College of Pharmacy, Toronto, "
 Pharmaceutical Department, Halifax Medical College, Nova Scotia.
 Escuela de Farmacia, Mexico.
 Sociedad Medico-farmacéutico, Merida, Yucatan.
 Sociedad de Farmacia Argentina, Buenos Ayres.
 British Pharmaceutical Conference, Dr. J. Attfield, London.
 Pharmaceutical Society of Great Britain, London.
 Pharmaceutical Journal and Transactions, London.
 Chemical News, London.
 Chemist and Druggist, London.
 Journal of Applied Science, London.
 British Museum, London.
 Philosophical Society, Glasgow.
 Liverpool Chemists' Association.
 Association of Chemists and Druggists, Wolverhampton.
 Coventry and Warwickshire Pharmaceutical Association, Coventry.
 Pharmaceutical Society at Edinburgh.
 Nederlandsche Maatschappij ter bevordering der Pharmacie, A. J. Rijk,
 President, Amsterdam.
 Académie Royale de Médecine de Belgique, Bruxelles.
 Société de Pharmacie Royale de Bruxelles.
 Société Royale des Sciences Médicales et Naturelles, Bruxelles.
 Société de Pharmacie d'Anvers.
 Société de Pharmacie, Paris.
 Académie des Sciences, Paris.
 Répertoire de Pharmacie, Paris.
 Schweizerische Wochenschrift für Pharmacie.
 Zeitschrift d. Allg. Oesterreichischen Apotheker-Vereins. Wien.
 K. K. Gesellschaft der Aerzte, Wien.
 K. Akademie der Wissenschaften, Wien.
 K. Bayer, " " München.
 University of Strassburg.
 Journal de Pharmacie d'Alsace-Lorraine, N. Nicklès, Benfeld.
 Deutscher Apotheker-Verein.
 Archiv der Pharmacie, Waisenhausbuchhandlung, Halle.
 Professor Dr. Wöhler, Göttingen.
 K. Akademie der Wissenschaften, Göttingen.
 Verein der Apotheker, Berlin.
 Pharmaceutische Centralhalle, Dr. H. Hager, Pulvermühle bei Fürstenberg.
 Pharmaceutische Zeitung, Bunzlau.
 Pharmaceutische Gesellschaft in St. Petersburg, St. Petersburg.
 Pharmaceutisches Institut, Dorpat, Russia.
 Pharmaceutical Institution, Stockholm, Sweden.
 Kongelige Norske Universitet i Christiani.
 Archiv for Pharmaci, S. M. Trier, Kjobenhavn.
 Danmark's Apotheker Forening, Gust. Lodze, President, Odense.
 Centro Pharmaceutico Portuguez, Porto, Portugal.

836 SOCIETIES TO WHOM PROCEEDINGS ARE FORWARDED.

Archivio di Farmacia, Roma, Italy.

R. Biblioteca Nazionale, Firenze, Italy.

Pharmaceutical Society of Victoria, Melbourne, Australia.

Pharmaceutical Society of New South Wales, Sydney.

Pharmaceutical Society of New Zealand, Auckland.

CONSTITUTION AND BY-LAWS

OF THE

AMERICAN PHARMACEUTICAL ASSOCIATION.

CONSTITUTION.

ARTICLE I. This Association shall be called the "American Pharmaceutical Association." Its aim shall be to unite the educated and reputable Pharmacutists and Druggists of America in the following objects :

1. To improve and regulate the drug market, by preventing the importation of inferior, adulterated, or deteriorated drugs, and by detecting and exposing home adulteration.

2. To encourage proper relations between Druggists, Pharmacutists, Physicians, and the people at large, which shall promote the public welfare, and tend to mutual strength and advantage.

3. To improve the science and art of Pharmacy by diffusing scientific knowledge among Apothecaries and Druggists, fostering pharmaceutical literature, developing talent, stimulating discovery and invention, and encouraging home production and manufacture in the several departments of the drug business.

4. To regulate the system of apprenticeship and employment, so as to prevent, as far as practicable, the evils flowing from deficient training in the responsible duties of preparing, dispensing, and selling medicines.

5. To suppress empiricism, and to restrict the dispensing and sale of medicines to regularly educated Druggists and Apothecaries.

6. To uphold standards of authority in the Education, Theory, and Practice of Pharmacy.

7. To create and maintain a standard of professional honesty equal to the amount of our professional knowledge, with a view to the highest good and greatest protection to the public.

ARTICLE II. This Association shall consist of active, life, and honorary members, and shall hold its meetings annually.

ARTICLE III. The officers of the Association shall be a President, three Vice-Presidents, a Permanent Secretary, a Local Secretary, a Treasurer, and a Reporter on the Progress of Pharmacy, all of whom, with the exception of the Permanent Secretary, shall be elected annually, and shall hold office until an election of successors.

ARTICLE IV. All moneys received from life membership, together with such funds as may be bequeathed, or otherwise donated to the Association, shall be invested by the Treasurer in United States Government or State securities, the annual interest of which only shall be used by the Association for its current expenses.

ARTICLE V. Every proposition to alter or amend this Constitution shall be submitted in writing, and may be balloted for at the next Annual Meeting; when, upon receiving the votes of three-fourths of the members present, it shall become a part of this Constitution.

BY-LAWS.

CHAPTER I.

Of the President and Vice-Presidents.

ARTICLE I. The President shall preside at all meetings of the Association; in his absence or inability, one of the Vice-Presidents, or in the absence of all, a President *pro tempore* shall perform the duties of President.

ARTICLE II. In the absence of the Permanent Secretary, the President shall appoint a Recording Secretary *pro tempore*.

ARTICLE III. In meetings the President shall take the chair at the proper time; announce all business; receive all proper motions, resolutions, reports, and communications, and order the vote upon all proper questions at the proper time.

ARTICLE IV. In all ballotings, and on questions upon which the yeas and nays are taken, the President is required to vote, but his name should be called last; in other cases he shall not vote, unless the members be equally divided, or unless his vote, if given to the minority, will make the decision equal, and in case of such equal division the motion is lost.

ARTICLE V. He shall enforce order and decorum; it is his duty to hear all that is spoken in debate, and in case of personality or impropriety he shall promptly call the speaker to order. He shall decide all questions of order, subject to the right of appeal, unless in cases where he prefers to submit the matter to the meeting; decide promptly who is to speak when two or more members rise at the same moment; and be careful to see that business is brought forward in proper order.

ARTICLE VI. He shall have the right to call a member to the chair, in order that he may take the floor, in debate. He shall see that the Constitution and By-Laws are properly enforced.

ARTICLE VII. He shall appoint all committees, unless provided for in the By-Laws, or otherwise directed by the Association.

ARTICLE VIII. He shall sign the certificates of membership, and counter-sign all orders on the Treasurer. He shall obey the instructions of the Association, and authenticate by his signature, when necessary, its proceedings.

ARTICLE IX. He shall present at each Annual Meeting an address, embodying general scientific facts and events of the year, or discuss such scientific questions as may to him seem suitable to the occasion.

CHAPTER II.

Of the Permanent Secretary.

ARTICLE I. The Permanent Secretary shall be elected to hold office permanently, during the pleasure of the Association. He shall receive from the Treasurer an annual salary of \$600, and the amount of his expenses incident to the meeting in addition to his salary.

ARTICLE II. He shall preserve fair and correct minutes of the proceedings of the meetings, and carefully preserve, on file, all reports, essays, and papers of every description received by the Association, and shall be charged with the necessary foreign and scientific correspondence, and with editing, publishing, and distributing the Proceedings of the Association, under the direction of the Executive Committee.

ARTICLE III. He shall read all papers handed him by the President for that purpose; shall call and record the yeas and nays whenever they are required to be called; shall notify the chairman of every special committee of his appointment, giving him a list of his colleagues, and stating the business upon which the committee is to act; and shall notify every member of the time and place of each annual meeting.

ARTICLE IV. He shall be, ex-officio, a member of the Executive Committee.

CHAPTER III.

Of the Local Secretary.

ARTICLE I. The Local Secretary shall be elected annually, near the close of the Annual Meeting, and shall reside at or near the place where the next Annual Meeting of the Association is to be held.

ARTICLE II. He shall assist the Permanent Secretary in his duties; shall co-operate with any local committee in making arrangements for the Annual Meeting; shall correspond with the chairmen of the several committees, and with other members, in advance of the meeting, for the promotion of its objects, and shall have the custody of specimens, papers, and apparatus destined for use or exhibition at the meetings.

CHAPTER IV.

Of the Treasurer.

ARTICLE I. The Treasurer shall collect and take charge of the funds of the Association, and shall hold, sign, and issue the certificates of membership.

ARTICLE II. He shall pay no money except on the order of the Secretary, countersigned by the President, and accompanied by the proper vouchers.

ARTICLE III. He shall report to the Executive Committee, previous to each Annual Meeting, the names of such members as have failed to pay their annual contributions for three years, and also the names of such as have failed to return their certificates of membership after having been officially disconnected with the Association, and having been duly notified to return them.

ARTICLE IV. He shall present a statement of his accounts at each Annual Meeting, that they may be audited; he shall receive an annual salary of \$500, and the amount of his expenses incident to the meeting in addition to his salary.

CHAPTER V.

Of the Reporter on the Progress of Pharmacy.

ARTICLE I. The Reporter on the Progress of Pharmacy shall be elected annually, and shall receive from the Treasurer for his services such sum as may be annually determined upon.

ARTICLE II. All journals and volumes received in exchange for the Proceedings by the Permanent Secretary, and such other journals as shall be deemed necessary, shall be sent to him by that officer for use in the compilation of his report; for all of which he shall be held responsible until returned to the Permanent Secretary for preservation.

ARTICLE III. From these and other available sources he shall prepare a comprehensive report on the improvements and discoveries in Pharmacy, Chemistry, and Materia Medica, and the collateral branches of knowledge; on the changes in conditions of Pharmaceutical Institutions, together with such statistical, biographical, and obituary notices as will furnish an epitome of the progress and changes in the science and practice of Pharmacy, and of its votaries at home and abroad.

ARTICLE IV. The Report on the Progress of Pharmacy shall commence with July 1st of the preceding year, and end with June 30th of the year in which it is submitted, shall be written in a form fitted for the printer, and shall be presented completed at the Annual Meeting.

ARTICLE V. In case of the illness or other inability of the Reporter to carry on the work of the report, the Permanent Secretary and the Chairman of the Executive Committee shall be required to make the best arrangements they can command, to continue the work to its completion.

CHAPTER VI.

Of Committees.

ARTICLE I. There shall be elected annually six standing committees: An Executive Committee, and a Committee on the Drug Market, each to consist of five members; a Committee on Papers and Queries, a Business Committee, a Committee on Prize Essays, and a Committee on Legislation; each to consist of three members.

ARTICLE II. *Section 1.* The Executive Committee, of which the Permanent Secretary shall be a member, shall have charge of the revision of the roll and the publication of the Proceedings.

Sec. 2. The chairman of this committee shall read at one session the names of those candidates for membership which have been approved by them, and the applicants shall be balloted for at the next session by the members present, when a vote of two-thirds shall be sufficient to elect them.

Sec. 3. The Executive Committee shall also hear and decide upon any objections which may be presented to them, referring to the fitness of the candidates for membership; and no names shall be balloted for without first receiving the approval of this committee.

ARTICLE III. They shall report at each meeting a revised roll of members, with appropriate notices of deceased members, and the names of any who, having become disconnected with the Association, refuse to return their certificates of membership as provided by the By-laws.

ARTICLE IV. They shall furnish to each member of the Association not in arrears one copy of the annual publication of the Proceedings, which publication shall contain the correct roll of members, full minutes of the several sittings, the Reports of the President and of the Committees, together with such addresses, scientific papers, discussions, notices of new processes, and preparations, as the Executive Committee may deem worthy of insertion, and shall fix the price at which the Proceedings shall be sold.

ARTICLE V. The Committee on the Drug Market shall report annually the condition of the Drug Market, the fluctuations in the supply and demand of drugs and chemicals, the variations in quality, and the adulterations and sophistications coming under their observation or reported to them by others, with any suggestions or recommendations for the improvement or better regulation of the trade; and they shall be authorized to report upon any adulterations and sophistications of immediate interest, through the Pharmaceutical Journals, as soon as practicable after their discovery.

ARTICLE VI. The Committee on Papers and Queries shall receive all Reports of Standing Committees, and all papers for the Association. They shall designate which of them shall be read at length, or which by title, and shall be furnished with a synopsis of each by the authors. They shall, in connection with the Business Committee, arrange the time which may be most appropriate or convenient for reading them.

ARTICLE VII. The Committee on Papers and Queries shall report, near the close of each Annual Meeting, a proper number of questions of scientific

and practical interest, the answers to which may advance the interests of Pharmacy, and shall procure the acceptance of as many such questions for investigation as may be practicable.

ARTICLE VIII. Any person writing a paper for the Association must, to insure its publication in the Proceedings, refer the same with a synopsis of its contents to the Committee on Papers and Queries previous to the third session.

ARTICLE IX. It shall be the duty of every Standing Committee making a report annually to the Association, in like manner to furnish a copy of the same, together with a synopsis of its contents, to the Committee on Papers and Queries, before the first annual session of the Association.

ARTICLE X. The Business Committee shall be charged with the transmission of unfinished business from one Annual Meeting to another, and with collecting, arranging, and expediting the business during the sessions of the Annual Meetings.

ARTICLE XI. The Committee on Prize Essays shall, within six months after the Annual Meeting at which the essays are presented, determine which, if any of them, has met the requirements of the founder of the prize. In all other respects they shall be governed by the stipulations expressed by the donor. The decision of the committee, with such comments upon the successful essay only as they may deem proper, may be published in the journals of pharmacy.

ARTICLE XII. The Committee on Legislation shall keep a record of, and compile for reference, the enactments of the different States regulating the practice of pharmacy and the sale of medicines. They shall report to each stated meeting of the Association what legislation on the subject has occurred during the year.

CHAPTER VII.

Of Membership.

ARTICLE I. Every pharmacist and druggist of good moral and professional standing, whether in business on his own account, retired from business, or employed by another, and those teachers of Pharmacy, Chemistry, and Botany, who may be specially interested in Pharmacy and *Materia Medica*, who, after duly considering the objects of the Association and the obligations of its Constitution and By-laws, are willing to subscribe to them, are eligible to membership.

ARTICLE II. Any person eligible to membership may make application in writing, with the indorsement of any two members of the Association in good standing, to any member of the Executive Committee, who shall report his application to the said Committee.

ARTICLE III. No person shall be a member of this Association, nor shall his name be placed upon the roll, until he shall have signed the Constitution and paid into the Treasury the sum of *Five Dollars* as an initiation fee, and the annual contribution for the current year.

ARTICLE IV. Every member shall pay in advance to the Treasury the sum of *Five Dollars* as his yearly contribution, and is liable to lose his membership by neglecting to pay said contribution for *three successive years*.

ARTICLE V. Any member not in arrears to the Association, who shall pay to the Treasurer the sum of \$75 during the first year of his connection therewith, or after five years \$70, or after ten years \$60, or after fifteen years \$50, or after twenty years \$40, shall become a life member and shall be exempt from all future annual contributions.

ARTICLE VI. All local organizations of Pharmacists shall be entitled to *five delegates*, as their representatives in the Annual Meetings, who, *if present*, become members of the Association on signing the Constitution and paying the annual contribution for the current year and the usual initiation fee.

ARTICLE VII. Members shall be entitled, on the payment of *Five Dollars*, to receive a certificate of membership signed by the President, one Vice-President, Permanent Secretary, and Treasurer, at the same time covenanting to return the same to the proper officer on relinquishing their connection with the Association.

ARTICLE VIII. Persons constitutionally elected to membership become permanent members, and their membership can cease only by resignation, non-payment of dues, or by expulsion, as provided in these By-laws.

ARTICLE IX. Resignation of membership shall be made in writing to the Permanent Secretary or Treasurer, but no resignation shall be accepted from any one who is in arrears to the Treasury.

All resignations shall be acknowledged in writing by the officer who receives them, and shall be reported at the next Annual Meeting.

ARTICLE X. Any member may be expelled for improper conduct or the violation of the Constitution, By-laws, or Ethics adopted by the Association, but no person shall be expelled unless he shall receive for expulsion two-thirds of all the votes cast at some regular session.

ARTICLE XI. Pharmacutists, chemists, and other scientific men, who may be thought worthy the distinction, may be elected honorary members. They shall not, however, be required to contribute to the funds, nor shall they be eligible to hold office, or vote at the meetings.

CHAPTER VIII.

Of Meetings.

ARTICLE I. The meetings shall be held annually; provided, that in case of failure of this from any cause the duty of calling the Association together shall devolve upon the President or one of the Vice-Presidents, with the advice and consent of the Executive Committee.

ARTICLE II. The order of business at the first session of each Annual Meeting shall be as follows:

Section 1. Promptly, at the time named in the notice issued for the meeting, the President, or in his absence one of the Vice-Presidents, or in their absence a President *pro tempore*, shall officiate.

Section 2. In the absence of the Permanent Secretary the President shall appoint a Recording Secretary *pro tempore*, who shall perform the duties of the Permanent Secretary until his arrival.

Section 3. Nineteen members shall constitute a quorum for the transaction of business.

Section 4. The President shall appoint a committee of three persons to examine the credentials of delegates, which committee shall attend to that duty. The President's address may then be read, after which the committee shall report to the Association as soon as practicable, when the Secretary shall call the roll, noting the names of the delegates and members in attendance.

Section 5. The Executive Committee shall read the names of the candidates for membership, as provided in Section 2, Article II, Chapter VI.

Section 6. Reports of committees shall be presented, read by their titles, the synopsis, or in full, and laid on the table for future consideration.

Section 7. The President shall call the roll of Colleges and Associations represented, requesting each delegation in turn to appoint one member, the persons so selected to act as a committee to nominate officers and the Standing Committees for the ensuing year; in addition to which he shall appoint five members, who are not delegates, to act with the committee.

Section 8. The reports of the Executive Committee, of the Permanent Secretary, and of the Treasurer, shall be read by title or in full.

Section 9. A committee of five shall be appointed to examine and report upon specimens exhibited.

Section 10. Incidental business may be called up by the Business Committee.

ARTICLE III. The order of business at the second session of each Annual Meeting shall be as follows:

Section 1. The President shall call the Association to order.

Section 2. The Secretary shall read the minutes of the preceding meeting, which may be amended if necessary, and shall then be approved.

Section 3. The report of the Committee on Nominations shall be read; when the President shall appoint tellers, and the Officers and Committees nominated shall be balloted for.

Section 4. The officers elected shall take their respective places.

Section 5. The Executive Committee shall present names recommended for membership, when a ballot shall be ordered for their election.

Section 6. Reports of Standing Committees shall be read.

Section 7. Reports of Special Committees shall be read.

Section 8. The second session shall close with the examinations of specimens on exhibition.

ARTICLE IV. The order of business at subsequent sessions shall be determined by the Business Committee, with the consent of the Association.

ARTICLE V. Section I. The Association invites manufacturers and others to exhibit at the annual meeting crude drugs, chemicals, pharmaceutical prep-

arations, chemical and pharmaceutical apparatus and utensils, and such objects as possess a general scientific or special pharmaceutical interest.

Section 2. The following articles shall not be admitted to these exhibitions : Proprietary and patented medicines, medicinal or pharmaceutical preparations the names of which have been copyrighted or the complete working formula for which is withheld, and such chemical preparations or mixtures which are offered under other than their proper scientifically recognized names.

Section 8. The Committee on Exhibition, appointed under Chapter VIII, Article II, Section 9, shall report during the meeting on the articles exhibited with such comments as in their judgment may be deemed proper.

CHAPTER IX.

Of Rules of Order and Debate.

ARTICLE I. The ordinary rules of parliamentary bodies shall be enforced by the presiding officer, from whose decision, however, appeals may be taken, if required by two members, and the meeting shall thereupon decide without debate.

ARTICLE II. When a question is regularly before the meeting, and under discussion, no motion shall be received but to adjourn, to lay on the table, for the previous question, to postpone to a certain day, to commit or amend, to postpone indefinitely ; which several motions have precedence in the order in which they are arranged. A motion to adjourn shall be decided without debate.

ARTICLE III. No member may speak twice on the same subject, except by permission, until every member wishing to speak has spoken.

ARTICLE IV. On the call of any two members, the yeas and nays shall be ordered, when every member shall vote, unless excused by a majority of those present, and the names and manner of voting shall be entered on the minutes.

CHAPTER X.

Miscellaneous.

ARTICLE I. In all such points of order as are not noticed in these By-laws the Association shall be governed by the established usages in all assemblies governed by parliamentary rules.

ARTICLE II. Every proposition to alter or amend these By-laws shall be submitted in writing, and may be balloted for at any subsequent session, when, upon receiving the votes of three-fourths of the members present, it shall become a part of the By-laws.

ARTICLE III. No one or more of these By-laws shall be suspended.

FORM OF APPLICATION FOR MEMBERSHIP.

APPROVING of the objects of the American Pharmaceutical Association, I am desirous of joining it in membership; and, having read its Constitution and By-laws, I hereby signify my approval of the same, and subscribe to them.

.....
Address,

I hereby agree to return my certificate of membership in the American Pharmaceutical Association to the Treasurer of that body, if I shall hereafter cease to be connected in membership with it.

.....
TESTIMONIALS.

The undersigned, members in good standing, being personally acquainted with _____ of _____ testify to his moral character, his skill as a practical Druggist and Pharmaceutist, and his professional probity and good standing, and they recommend him for membership in the American Pharmaceutical Association.

NAME.

ADDRESS.

ROLL OF MEMBERS.

HONORARY MEMBERS.

UNITED STATES OF AMERICA.

Daniel B. Smith, Philadelphia, Penn., 1856.

FOREIGN COUNTRIES.

AUSTRIA.

Anton von Waldheim, Vienna, 1871.

BELGIUM.

A. T. De Meyer, Brussels, 1868. Norbert Gille, Brussels, 1868.

ENGLAND.

Dr. John Attfield, London, 1871. Henry B. Brady, Newcastle-on-Tyne, 1871.
Dr. Robert Bentley, London, 1872. Dr. J. Redwood, London, 1871.

FRANCE.

Dr. Augustin A. Délonde, Sevres, 1871. Dr. G. Planchon, Paris, 1877.
Stanislas Martin, Paris, 1872. Dr. J. Léon Soubeiran, Montpellier,
1871.

GERMANY.

Dr. Adolph Duflos, Breslau, 1871. Dr. F. A. Flückiger, Strassburg, 1868.
Dr. Hermann Hager, Pulvermühle Dr. L. A. Wiggers, Göttingen, 1877.
bei Fürstenberg, 1868. Dr. G. C. Wittstein, Munich, 1868.

GREECE.

Dr. Xaver Landerer, 1877.

NETHERLANDS.

Dr. J. E. De Vrij, Hague, 1871.

RUSSIA.

Dr. G. Dragendorff, Dorpat, 1868.

SWITZERLAND.

Dr. Edward Schaer, Zurich, 1877.

ACTIVE MEMBERS.

Members are requested to report any inaccuracies in these lists, and to notify the Secretary and Treasurer of all changes of address.

(The names of life members in SMALL CAPITALS. Names of life members under the old Constitution in *italics*.)

UNITED STATES OF AMERICA.

ALABAMA.

Mobile.

Candidus, Philip Charles,	. 1857
Hawkins, Joseph T.,	. 1878
Mohr, Charles,	. 1871
Moore, Thomas F.,	. 1878
Punch, William F.,	. 1874

CALIFORNIA.

San Francisco.

Calvert, John,	. 1870
Lengfeld, A. L.,	. 1879
Moffit, Thomas S.,	. 1861
Painter, Emlen,	. 1870
Runyan, Edward W.,	. 1875
Simpson, William,	. 1870
Steele, Henry,	. 1859
Steele, James G.,	. 1859
Wenzell, William T.,	. 1870

Eureka, Humboldt Bay.

McKay, George Johnson,	. 1864
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Marysville, Yuba Co.

Flint, John Henry,	. 1878
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San Jose.

Brown, Joseph John,	. 1876
Wagener, Samuel Hopkins,	. 1869

Santa Barbara.

Finger, Henry J.,	. 1878
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Vallejo, Solano Co.

Frost, James,	. 1870
Topley, James,	. 1869

COLORADO.

Central City.

Best, John,	. 1866
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Denver.

Hartung, Hugo Rudolph,	. 1876
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COLUMBIA, DISTRICT OF.

Georgetown.

Becker, Charles,	. 1875
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Washington.

Baldus, William Theodore,	. 1872
Bannwart, Charles A.,	. 1856
Berrian, George W., Jr.,	. 1857
Bury, Edward Berkley,	. 1870
Christiani, Charles,	. 1874
Cromwell, Zachariah William,	. 1870
Drew, John Waters,	. 1876
Duckett, Walter G.,	. 1876
Dufour, Clarence Reuter,	. 1876
Entwisle, William Burton,	. 1873
Ferguson, Robert Benedict,	. 1867
Heller, Peter Henry,	. 1871
Knabe, Gustavus Alexander,	. 1876
Lewis, Samuel Edwin,	. 1875
Major, John Richards,	. 1878
Milburn, John Alexander,	. 1858
O'Donnell, James Dominic,	. 1870
Oldberg, Oscar,	. 1878
Reinlein, Paul,	. 1856
Scala, William Franklin,	. 1876
Schafhirt, Adolph Julian,	. 1876
Simms, Giles Green Craycroft,	. 1860

Thompson, William Scott, . 1871
Tyson, Samuel Ellicott, . 1857

CONNECTICUT.

Hartford.

Goodrich, Stephen, . 1875
Goodwin, Lester Henry, . 1875
Rapelye, Charles Andrew, . 1876
Wells, John C., . 1875
Williams, John Kirby, . 1875

Danbury.

Perry, Frank Vinton, . 1876

Litchfield.

Gates, Howard Eugene, . 1878

Middletown.

Pitt, John Richard, Jr., . 1872

Naugatuck.

May, James Oscar, . 1875

New Haven.

Dimock, Robert Hemphill, . 1876
Gessner, Emil A., . 1878
Kelsey, Henry, Jr., . 1878
Spalding, Warren Alphonso, . 1876
Wells, Romanta, . 1877
Wood, Alonzo Felton, . 1876

Norwich.

Osgood, Hugh Henry, . 1875
Sevin, Nathan Douglass, . 1875

Stamford.

Haight, William Bogardus, . 1872
Morrison, Samuel C., . 1871

Waterbury.

Dikeman, Nathan, . 1859
Munson, Luzerne Ithiel, . 1872
Wilcox, Frederick, . 1878
Woodruff, Roderick Samuel, . 1876

West Winsted.

Phelps, Dwight, . 1878

Winsted.

Renouff, James Theron, . 1877

DELAWARE.

Wilmington.

Belt, Zedekiah James, . 1876
McInall, Edward, Jr., . 1867
Smith, Linton, . 1870

FLORIDA.

Fort George.

Rohrbach, Theodore, . 1876
Rollins, John Francis, . 1859

Jacksonville.

Hughes, Benjamin Longmore, . 1878

Monticello.

Palmer, John Dabney, . 1875

Waldo.

Wheeler, Lucian F., . 1858

GEORGIA.

Albany.

Welch, Leonard E., . 1878

Athens.

Brumby, Robert Trapier, . 1878

Atlanta.

Avary, Archibald, . 1878
Bradfield, L. H., . 1878
Candler, Asa Griggs, . 1878
Daniels, John B., . 1871
Greene, Charles H., . 1878
Howarth, James L., . 1877
Peacock, Frederick S., . 1871
Pinson, John L., . 1878
Rankin, Jesse Willis, . 1877
Reynolds, John J., . 1876
Schumann, Peter John, . 1878
Schumann, Theodore, . 1860
Taylor, Walter Adolphus, . 1876

Augusta.

Hankinson, Thomas S., . 1878
Land, Robert Henry, . 1859
Tarrant, Homer Post, . 1875

Cartersville.

Curry, David W., . 1878

<i>Cochran.</i>			Fredigke, Charles Christian, .	1869
Morgan, Young Hiram, .	1878		Fuller, Henry Weld, .	1866
<i>Cuthbert.</i>			Fuller, Oliver Franklin, .	1869
Stanford, James William, .	1878		Gale, Edwin Oscar, .	1857
<i>Hawkinsville, Pulaski Co.</i>			Gale, William Henry, .	1857
Ellis, William L. A., .	1878		Garrison, Herod Daily, .	1869
Fale, John, .	1877		Hallberg, Carl Swante Nicanor, .	1879
<i>Macon.</i>			Heuermann, Henry William, .	1869
Brunner, Norman Isaac, .	1878		Hogan, Lewis Cass, .	1876
Hall, Roland Butler, .	1877		Hooper, John H., .	1865
Hunt, Leonard Washington, .	1878		Jacobus, Judson Schradlow, .	1870
Ingalls, John, .	1876		Jauncey, William, .	1873
McConnell Thomas Aloysius, .	1864		Krusemarck, Charles, .	1876
Menard, Alexander Ambrose, .	1877		Mahla, Frederick, .	1864
<i>Milledgeville.</i>			McPherson, George, .	1865
Clark, John Marin, .	1857		Mill, James Wishart, .	1864
Grieve, Fleming Grantland, .	1859		Milleman, Philip Lionel, .	1866
Cotting, William Augustus, .	1869		Parsons, John, .	1865
<i>Rome.</i>			Pratt, Delbert Elwyn, .	1879
Fenner, William Roane, .	1871		Reinhold, William, .	1866
Turnley, Prior Lee, .	1878		Sargent, Ezekiel Herbert, .	1864
<i>Savannah.</i>			Sharp, Joseph Perine, .	1865
Butler, Osceola, .	1878		Somers, Frank Giddings, .	1877
Yonge, St. John R., .	1878		Strehl, Louis C., .	1866
ILLINOIS.			Sweet, Henry, .	1865
<i>Bloomington.</i>			Vogeler, Adolph Gustav, .	1876
Dyson, Dunbar Smith, .	1856		Wheeler, Charles Gilbert, .	1876
<i>Bradford, Stark Co.</i>			WHITFIELD, THOMAS, .	1865
Plummer, David Graham, .	1869		Wilson, Julius Henry, .	1869
<i>Chicago.</i>			Woltersdorf, Louis, .	1865
Bartlett, Nicholas Gray, .	1864		<i>Danville.</i>	
Bell, Alexander C., .	1879		Winslow, Edwin Cook, .	1879
Biroth, Henry, .	1865		<i>Englewood, Cook Co.</i>	
Blocki, William Frederick, .	1863		Peirpoint, Newton, .	1869
Borland, Matthew Wilson, .	1876		<i>Galesburg.</i>	
Buck, George, .	1860		Clark, Albert Burr, Jr., .	1868
Coffin, Samuel L., .	1879		<i>Highland.</i>	
Cowdrey, Robert H., .	1879		Mueller, Adolphus, .	1871
Ebert, Albert Ethelbert, .	1864		<i>Mascoutah.</i>	
Fischer, Edward J., .	1875		Henrich, George, .	1875
Fox, Daniel S., .	1872		<i>Peoria.</i>	
			Singer, Peter Joseph, .	1869

<i>Quincy.</i>			<i>Madison.</i>		
Schroder, Hermann, . . .	1871		Harper, Frank Merritt, . . .	1874	
INDIANA.			<i>New Albany.</i>		
<i>Anderson.</i>			Conner, Jefferson Somerville, .	1876	
Brandon, John Frank, . . .	1879		Hoffeld, Alfred Hermann, . . .	1879	
Buck, Albert Byron, . . .	1879		Knoefel, August,	1879	
<i>Aurora.</i>			Scribner, Benjamin Franklin, .	1858	
Marshall, Hubert Joseph, . .	1877		<i>Rushville.</i>		
Riddell, James A.,	1879		Pugh, Finley Bigger,	1876	
<i>Evansville.</i>			<i>Seymour.</i>		
Schloepfer, Henry J.,	1879		Andrews, Josiah H.,	1879	
<i>Fairmount.</i>			<i>Tell City.</i>		
Edwards, Nathan W.,	1879		Schreiber, August,	1876	
<i>Indianapolis.</i>			<i>Terre Haute.</i>		
Barthels, Joseph,	1879		Baur, Jacob,	1879	
Dill, J. B.,	1878		Buntin, William Campbell, . .	1874	
Dryer, James Wilkinson, . . .	1871		IOWA.		
Haag, Julius A.,	1879		<i>Burlington.</i>		
Kielhorn, Henry,	1874		Squires, Charles Park,	1876	
Lambert, John Albert,	1879		Wigert, Carl Reinhold,	1876	
Lilly, Eli,	1878		<i>Davenport.</i>		
Martin, Emil,	1878		Ballard, John Winthrop,	1871	
Metzner, Adolph,	1879		<i>Dubuque.</i>		
Mueller, Louis H.,	1879		Ferdinand, George A.,	1879	
Perry, Joseph R.,	1879		Nienstædt, Hermann,	1879	
Schrader, Henry,	1869		Ruete, Theodore William,	1870	
Sloan, George White,	1857		<i>Fort Dodge.</i>		
Timberlake, Arthur,	1879		Oleson, Olaf Martin,	1877	
<i>Jeffersonville.</i>			<i>Fort Madison.</i>		
Loomis, John Clarence,	1876		Schaefer, George Henry,	1871	
<i>Kokomo.</i>			<i>Iowa City.</i>		
Irvin, William Armstrong, . . .	1879		Boerner, Emil Louis,	1877	
<i>Lafayette.</i>			<i>Monticello.</i>		
Hilt, David,	1879		Tiarks, Hermann,	1876	
Yeakel, Nathan Webb,	1879		KANSAS.		
<i>Lawrenceburgh.</i>			<i>Lawrence.</i>		
Ferris, Charles E.,	1874		Leis, George,	1869	
<i>Kendallville.</i>					
Lohman, George H.,	1872				

KENTUCKY.*Bardstown.*

Venable, R. H., . 1879

Rowling Green.

Burge, J. O., . 1878

Catlettsburg.

Patton, William Allison, . 1878

Covington.

Nodler, Peter, . 1870

Zwick, George Gilbert, . 1874

Frankfort.

Averill, William Henry, . 1874

Harrodsburg, Mercer Co.

Abell, Russell, . 1878

Hopkinsville.

Gray, Francis Marion, . 1876

Lexington.

Frost, John Johnson, . 1874

Richardson, Marcus D., . 1874

Wood, Theodore Bell, . 1879

Louisville.

Beckmann, Oscar A., . 1879

Colgan, John, . 1867

Davis, Vincent, . 1874

Diehl, Conrad Lewis, . 1868

Huddart, John Fletcher, . 1870

Jones, Simon Newton, . 1870

Kessler, Edward Fredrik, . 1879

McAfee, James Alexander, . 1874

Miller, Frederick Christopher, . 1874

Newman, George Abner, . 1866

Pfingst, Edward Charles, . 1874

Pfingst, Ferdinand John, . 1867

Pfingst, Henry Adolph, . 1874

Rademaker, H., . 1879

Rogers, Wiley, . 1874

Scheffer, Emil, . 1872

Strassel, William, . 1870

Sutton, Peter Priest, . 1871

Wilder, Graham, . 1868

Maysville.

Blattermann, George W., . 1876

Nicholasville.

Oxley, Jefferson, . 1878

Owensboro.

Courtney, W. T., . 1879

Shelbyville.

McKenney, Jesse Fisher, . 1878

Simpsonville.

Webb, M. H., . 1879

LOUISIANA.*New Orleans.*

Flemmich, Doric Ball, . 1877

Girling, Robert Nast, . 1876

Keffner, William P., . 1866

Lyons, Isaac Luria, . 1875

Thompson, Thomas Charles, . 1876

Baton Rouge.

Brooks, F. M., . 1879

Bayou Goula.

Viallon, Paul L., . 1870

Gretna.

Langebecker, Charles Oscar, . 1876

New Iberia.

Lee, James Augustin, . 1856

Plaquemine.

Deilavallade, John M., . 1873

Thibodeaux.

Thibodeaux, Joseph Theogine, . 1870

Vidalia.

Schaaf, Justis Henry, . 1875

MAINE.*Augusta.*

Partridge, Charles Kimball, . 1867

Bangor.

Harlow, Noah Sparhawk, . 1859

Patten, John Frederic, . 1871

<i>Bath.</i>			Eareckson, Edwin, . . .	1875
Anderson, Samuel, . . .	1876		Elliott, Henry Alexander, .	1859
<i>Belfast.</i>			Emich, Columbus Valentine, .	1868
Moody, Richard Henry, . .	1876		Frames, James Parker, . .	1868
<i>Biddeford.</i>			Gosman, Adam John, . . .	1870
Boynton, Herschell, . . .	1875		Hancock, John Francis, . .	1868
<i>Eastport.</i>			Hassencamp, Ferdinand, . .	1872
Shead, Edward Edes, . . .	1866		Jackson, Vincent Rodman, .	1876
<i>Ellsworth.</i>			Jefferson, John Henry Bailey,	1868
Parcher, George Asa, . . .	1875		Jennings, Nathaniel Hynson, .	1857
<i>Lewiston.</i>			Lauer, Michael John, . . .	1865
Wakefield, Seth Davis, . .	1875		Lautenbach, Robert, . . .	1870
<i>Portland.</i>			Lilly, Alonzo, Jr.,	1868
Cummings, Henry Thornton, .	1858		Mittnacht, Henry,	1878
Dana, Edmund, Jr.,	1877		Monsarrat, Oscar,	1856
Frye, George C.,	1879		Moore, Jacob Faris,	1856
Hay, Henry Homer,	1867		Morrison, John Ellwood, . .	1868
Jordan, William Henry, . . .	1871		Muth, John Philip,	1864
Perkins, Benjamin A.,	1878		Osburn, William Henry, . . .	1870
Phillips, Walter Fiske,	1859		Perkins, Elisha Henry, . . .	1857
<i>Richmond.</i>			Roberts, Joseph,	1856
Donnell, J. Woodbury,	1875		Russell, Eugene Janus, . . .	1856
<i>Searsport.</i>			Russell, Edward Walton, . . .	1868
Curtis, Lebbens,	1875		Sappington, Richard,	1870
<i>Waterville.</i>			Sharp, Alpheus Phineas, . . .	1855
Plaisted, James H.,	1875		Thompson, William Silver, . .	1856
<i>Yarmouth.</i>			Thompson, William Partlow, .	1874
Richardson, James Hamilton, .	1868		Thomsen, John Jacob,	1856
<i>MARYLAND.</i>			Tilyard, Charles Slade, . . .	1867
<i>Baltimore.</i>			Webb, John Alansen,	1870
Baxley, Jackson Brown,	1856		Winkleman, John Henry, . . .	1864
Brack, Charles,	1876		Woodward, Samuel Morris, . .	1874
Brown, Alexander Ellis,	1868		<i>Annapolis.</i>	
Brown, William Henry,	1868		Button, Elijah,	1870
Dohme, Charles Emile,	1868		<i>Cumberland.</i>	
Dohme, Lewis,	1859		Campbell, William Pendleton,	1879
Donavin, Matthew Watson, . .	1867		Hermann, J. George,	1878
			Shriver, Henry,	1876
			Shryer, Thomas Wilson, . . .	1875
			<i>Frederick City.</i>	
			Schley, Steiner,	1878
			<i>Hagerstown.</i>	
			Winter, Jonas,	1868

MASSACHUSETTS.

Boston.

Babo, Leopold, . . .	1859
Barry, Daniel Edward, . .	1875
Bartlett, William Williams, .	1875
Bassett, Charles Harrison, .	1867
Bolles, William, . . .	1875
Boyden, Edward Cleveland, .	1874
Brown, Joseph Taylor, . .	1859
Brown, Joseph Taylor, Jr., .	1869
Burley, Edward Porter, . .	1877
<i>Burnett, Joseph,</i> . . .	1852
Campbell, Isaac Towle, . .	1859
Canning, Henry, . . .	1865
Carter, Solomon, . . .	1865
<i>Colcord, Samuel Marshall,</i> .	1852
Colton, James Byers, . . .	1865
<i>Covell, Thomas Jefferson,</i> .	1864
Craig, John Smith, . . .	1875
Cutler, Edward Waldo, . .	1859
Davenport, Bennett Franklin,	1879
<i>Doliber, Thomas,</i> . . .	1859
Drury, Linas Dana, . . .	1871
Eaton, Charles Irving, . .	1867
<i>Fowle, Henry Dearborn,</i> . .	1858
French, George Washington, .	1865
Fuller, Sumner Howard, . .	1875
Gleeson, James Andrew, . .	1859
Godding, John Granville, . .	1875
Goodale, Thomas Trefethen, .	1879
Groff, John E., . . .	1879
Hoagland, Pratt Ralph, . .	1868
Horton, William Francis, . .	1869
Hoyt, George Melvin, . . .	1875
Jagger, Charles Henry, . .	1875
Jenkins, Luther Lincoln, . .	1867
Jenks, Thomas Leighton, . .	1875
Jones, James Taber, . . .	1875
Kelly, Edward Samuel, . . .	1871
Kent, Robert Restieux, . .	1855
Leary, Jeremiah Thomas, . .	1869
<i>Lincoln, Henry Ware,</i> . . .	1853
Lowd, John Colby, . . .	1871
Luce, Edgar Henry, . . .	1879
Markoe, Geo. Frederick Holmes,	1863
<i>Melvin, James Samuel,</i> . . .	1858
<i>Metcalf, Theodore,</i> . . .	1857

O'Brien, James John, . . .	1875
Patch, Edgar Leonard, . . .	1872
<i>Patten, Ichabod Bartlett,</i> . .	1858
Pierce, William Herbert, . .	1879
Restieux, Thomas, . . .	1858
Ricker, George Dexter, . . .	1858
Sewall, David Jewett, . . .	1875
Sharples, Stephen Paschell, .	1875
Shedd, Edwin Walter, . . .	1879
Sheppard, Samuel Airus D., .	1865
Smalley, Elijah, . . .	1860
Snow, Jesse Walker, . . .	1875
Stowell, Daniel, . . .	1875
<i>Tompkins, Orlando,</i> . . .	1859
Tower, Levi, Jr., . . .	1860
Trask, Charles Mitchell, . .	1875
<i>Turner, Thompson Larkin,</i> . .	1853
Underwood, Charles Gordsford,	1865
Webster, Stephen, . . .	1875
Wilkins, Daniel Gilbert, . .	1865
Wilson, Benjamin Osgood, . .	1859
Winslow, Samuel W., . . .	1875
Wood, Edward S., . . .	1879
<i>Woodbridge, George Washington,</i>	1859
Wright, William Raith, . . .	1875

Andover.

Parker, George Hawkins, . .	1874
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Cambridge.

<i>Hubbard, John Henry,</i> . . .	1866
<i>James, Thomas Potts,</i> . . .	1857

Cambridgeport.

Bayley, Augustus Ramsey, . .	1859
Danforth, Edmund Culver, . .	1878
Orne, Joel Stone, . . .	1859
Orne, Charles Parker, . . .	1874
Thayer, Henry, . . .	1858

Charlestown.

Kettell, George Parker, . . .	1867
Marshall, Ernest Clifton, . .	1875
Stacey, Benjamin Franklin, .	1860

Chelsea.

Buck, John, . . .	1855
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<i>Clinton.</i>			<i>Lynn.</i>		
Holden, Henry Clay,	.	1870	Gordon, Edward Bertelle,	.	1875
<i>Danvers.</i>			Proctor, Benjamin,	.	1859
Merrill, Walter Stanley,	.	1875	Tozzer, Samuel Clarence,	.	1875
<i>Dedham.</i>			<i>Medford.</i>		
Follansbee, Sherman,	.	1875	Brigham, William Cleveland,	.	1877
<i>Dorchester.</i>			Howard, Daniel Newberry,	.	1877
Prescott, Horace Augustus,	.	1875	<i>Middleboro.</i>		
<i>East Cambridge.</i>			Drake, Charles William,	.	1878
Stackpole, Harry H.,	.	1878	<i>Milford.</i>		
<i>East Pepperell.</i>			Rice, John Allen,	.	1875
Denham, Charles Sumner,	.	1875	<i>Monson.</i>		
<i>Fitchburg.</i>			Phipps, John Mellen,	.	1875
Choate, John,	.	1877	<i>Natick.</i>		
<i>Great Barrington.</i>			Daniels, Samuel Olney,	.	1875
Lillie, Charles,	.	1875	<i>New Bedford.</i>		
Whiting, Frederick Theodore,	.	1863	Blake, James Edwin,	.	1866
<i>Haverhill.</i>			Hadley, Frank Rufus,	.	1872
Frothingham, Edward Gilman,	.	1875	Lawton, Charles Henry,	.	1878
Jr.,	.	1875	Lawton, Horace Allen,	.	1873
Underhill, William Harvey,	.	1879	Shurtleff, Israel Hammond,	.	1875
<i>Hingham.</i>			Taylor, John Pitman,	.	1875
Hunt, James Lewis,	.	1865	<i>Newburyport.</i>		
<i>Hinsdale.</i>			Atkinson, Albert Johnson,	.	1875
Plummer, George Bolton,	.	1875	<i>Newton Centre.</i>		
<i>Holyoke.</i>			Noble, John Joseph,	.	1875
Morgan, Richard Evan,	.	1875	<i>Pittsfield.</i>		
Wild, Joseph Oscar,	.	1878	Atwood, Luther Lee,	.	1876
<i>Lawrence.</i>			<i>Quincy.</i>		
Whitney, Henry Martyn,	.	1859	Whall, Joseph Stokes,	.	1878
<i>Lowell.</i>			<i>Rockland.</i>		
Bailey, Frederick,	.	1869	Easton, Luther Waite,	.	1875
Butler, Freeman Hall,	.	1874	Estes, Joseph Joselyn,	.	1870
Hood, Charles Ira,	.	1871	<i>Rockport.</i>		
Kidder, Samuel, Jr.,	.	1859	Blatchford, Eben,	.	1857
Wells, Charles William,	.	1879	<i>Salem.</i>		
			Nichols, Thomas Boyden,	.	1876
			<i>Shelbourne Falls.</i>		
			Baker, Edwin,	.	1875

<i>Somerville.</i>			<i>Kalamazoo.</i>		
Cowdin, George Henry, .	.	1875	MacDonald, George, .	.	1871
Flanagan, Lewis Cass, .	.	1875	<i>Monroe.</i>		
<i>Springfield.</i>			Sackett, Samuel M., .	.	1876
Alden, Charles Packard, .	.	1874	<i>Muskegon.</i>		
Ferree, Henry D., .	.	1875	Jesson, Jacob, .	.	1872
Gray, William H., .	.	1877	<i>Saginaw City.</i>		
Webber, Joseph Terrance, .	.	1878	Keeler, William Henry, .	.	1872
<i>Taunton.</i>			Moll, William, .	.	1869
Marvel, Amos Francis, .	.	1875	<i>Schoolcraft.</i>		
<i>Warren.</i>			James, George Riley, .	.	1869
Harwood, Frank Lucian, .	.	1875	<i>Ypsilanti.</i>		
Harwood, Lucian, .	.	1875	Morgan, James, .	.	1859
<i>Worcester.</i>			MINNESOTA.		
Burkbank, George C., .	.	1875	<i>St. Paul.</i>		
Bush, William, .	.	1875	Sweeney, Robert Ormsby, .	.	1866
Dinsmore, George F., .	.	1879	<i>Wilmar, Candegehei Co.</i>		
Fairbanks, Harlan, .	.	1876	Frost, William Arthur, .	.	1875
Scott, Nelson Ryan, .	.	1859	MISSISSIPPI.		
MICHIGAN.			<i>Bay St. Louis.</i>		
<i>Ann Arbor.</i>			Deléry, Edgar, .	.	1878
Eberbach, Ottmar, .	.	1869	<i>Jackson.</i>		
Prescott, Albert Benjamin, .	.	1871	Ash, Matthew Franklin, .	.	1856
<i>Battle Creek.</i>			MISSOURI.		
<i>Chelsea.</i>			<i>St. Louis.</i>		
De Puy, Caspar Edward, .	.	1879	Ahlbrandt, Henry Ernst, .	.	1877
<i>Detroit.</i>			Alexander, Maurice William, .	.	1871
Caldwell, James William, .	.	1875	Bang, Charles, .	.	1871
Holt, Alvin Everett, .	.	1873	Blank, Alois, .	.	1871
Johnston, William, .	.	1860	Boehm, Solomon, .	.	1871
Ronnefeld, Theodore, .	.	1866	Catlin, Ephron, .	.	1871
Vernor, James, .	.	1866	Catlin, Theron, .	.	1871
<i>East Saginaw.</i>			Chamberlain, Guilford Tracy, .	.	1858
Garrigues, Samuel Smith, .	.	1855	Crawford, William H., .	.	1864
Melchers, Henry, .	.	1869	Crawley, Francis Xavier, .	.	1869
<i>Jackson.</i>			Curtman, Charles Otto, .	.	1871
Austin, George Wesley, .	.	1865	Drake, Robert Samuel, .	.	1878
			Good, James Machener, .	.	1871
			Grandjean, Charles, .	.	1871

Grandjean, Eugene, . . . 1871
 Jones, Charles Kendall, . . . 1867
 Kalb, Theodore, . . . 1864
 Kirkbride, Joseph Cooper, . . 1869
 Klie, G. H. Charles, . . . 1878
 Krebs, Hugo, . . . 1871
Leitch, Arthur, . . . 1860
 Mallinckrodt, Edward, . . . 1869
 Meyor, Christian Fred'k Gottlieb, 1860
O'Gallagher, James, . . . 1858
 Pauley, F. G., . . . 1879
 Physick, Henry Sanford, . . . 1870
 Plumer, William S., . . . 1879
 Reichenbach, Frederick F., . . 1879
 Richardson, J. Clifford, . . . 1871
 Sander, Enno, . . . 1858
 Scheffer, Henry William, . . . 1863
 Scholz, Philip, . . . 1871
 Sennewald, Ferdinand William, 1865
 Tomfohrde, John William, . . . 1878
 Ude, George, . . . 1871
 Vardick, August Henry, . . . 1874
 Williamson, Edward John, . . . 1876
 Witte, Louis Edward, . . . 1871

Chillicothe.

Boyce, Samuel F., .. . 1871

Columbia.

Hurt, James F., . . . 1879

Kansas City.

Brackett, Aurick S., . . . 1868
 Ford, William Thomas, . . . 1878

Macon.

Field, Amos, . . . 1871

Mexico, Adrian Co.

Llewellyn, John Frederick, . . 1867

Trenton.

Featherston'h, Edward R., . . 1871

Weston.

Parr, John Conrad, . . . 1856

NEBRASKA.

Omaha.

Goodman, Charles Frederick, . . 1871

NEVADA.

Virginia City.

Perkins, William Alexander, . . 1869

NEW HAMPSHIRE.

Concord.

Eastman, Charles Smith, . . . 1874

Underhill, George Francis, . . . 1874

Dover.

Pinkham, Alonzo Taylor, . . . 1874

Rackley, Benjamin Franklin, . . 1874

TUFTS, CHARLES AUGUSTUS, . . . 1856

Vickery, William Henry, . . . 1874

Wingate, Jeremiah Young, . . . 1875

Exeter.

Merrill, Charles A., . . . 1858

Keene.

Appleton, George Josephus, . . . 1878

Lancaster.

Colby, Frank A., . . . 1876

Noyes, Parker Jewett, . . . 1874

Littleton.

Morrill, Benjamin, . . . 1876

Manchester.

Miville, Francis Charles, . . . 1877

Perry, Bayard Taylor, . . . 1876

Nashua.

Russell, Elias Smith, . . . 1875

Wallace, Austin Edward, . . . 1879

Whitman, Nelson Samuel, . . . 1875

New Market.

Dearborn, George Luther, . . . 1858

Portsmouth.

Marvin, Thomas Ellison Oliver, 1875

Thacher, Joseph Haven, . . . 1859

Rochester.

Hanson, Dominicus, . . . 1878

Shaw, Stephen F., . . . 1876

<i>Somersworth.</i>			<i>Morristown.</i>		
Jones, Charles Mortimer, .	.	1869	Carrell, Eugene Ayers, .	.	1875
Moore, George, .	.	1859	Dalrymple, Charles Hoagland, .	.	1860
<i>Suncook.</i>			McCarty, William, .	.	1878
Hildreth, Charles Francis, .	.	1874	<i>Mount Holly.</i>		
NEW JERSEY.			Miller, Louis, .	.	1874
<i>Bloomfield.</i>			White, Aaron Smith, .	.	1860
Scherff, John Philip, .	.	1877	<i>Newark.</i>		
<i>Burlington.</i>			Bruguier, Francis, .	.	1876
Vandegrift, John A., .	.	1867	Dreher, Ernest, .	.	1869
<i>Camden.</i>			Havenstein, Alexander, .	.	1870
Brown, Albert Potts, .	.	1870	Holzhauser, Charles, .	.	1873
Lee, Emmor Hunt, .	.	1875	Nichols, Edward Payson, .	.	1870
Sommers, Richard Miller, .	.	1876	Peters, Alexander Chase, .	.	1868
Test, Alfred William, .	.	1870	Sayre, William Henry, .	.	1877
<i>East Orange.</i>			Smith, Charles Bradley, .	.	1868
Rumsey, Samuel Louis, .	.	1876	Smith, Israel Preston, .	.	1876
<i>Elizabeth.</i>			Stamford, William Harrison, .	.	1876
Barnaby, Thomas J., .	.	1870	Townley, William Mattison, .	.	1875
Drake, Jonathan Baker, .	.	1875	Vandervoord, Ransford Wells, .	.	1870
Oliver, William Murray, .	.	1875	Van Gieson, Theron Watts, .	.	1869
<i>Elizabethport.</i>			Van Winkle, Abraham, .	.	1871
Frohwein, Richard, .	.	1867	<i>New Brunswick.</i>		
<i>Hackensack.</i>			Rust, William, .	.	1870
Adams, Hazen W., .	.	1879	<i>Orange.</i>		
<i>Hoboken.</i>			Harlow, Wickham Newman, .	.	1874
Klussman, Hermann, .	.	1876	Parsons, Robert Edwin, .	.	1877
<i>Jersey City.</i>			<i>Plainfield.</i>		
Abernethy, Maxwell, .	.	1865	Reynolds, Howard Prescott, .	.	1875
Dougherty, Samuel Edward, .	.	1875	Shaw, Robert Johnston, .	.	1875
Laird, William Rudolph, .	.	1867	Voorhees, William Henry, .	.	1868
Mercoin, James Randolph, .	.	1865	<i>South Amboy.</i>		
Pauly, Christian, .	.	1875	Jacques, George Washington, .	.	1869
Wienges, Conrad, .	.	1875	<i>Trenton.</i>		
<i>Medford.</i>			Mangold, Gustavus Adolph, .	.	1875
Thorn, Henry P., .	.	1879	Rickey, Randal, .	.	1870
<i>Moorestown.</i>			NEW YORK.		
Worthington, Jeremiah Willits, .	.	1878	<i>New York City.</i>		
			Alsderf, John, .	.	1872
			Ambler, Starr Hoyt, .	.	1876
			Atwood, Herman White, .	.	1878

Balluff, Paul,	1860	Jungmann, Julius,	1879
Balser, Gustavus,	1875	Kalish, Julius,	1875
Bedford, Peter Wendover,	1859	<i>Kiersted, Henry T.</i> ,	1856
Billings, Henry Merry,	1869	Kimmel, Henry,	1867
Bischof, Albert Sigismund,	1875	Krehbiel, Gustavus,	1865
Buehler, Edward Handy,	1874	Lazell, Lewis T.,	1858
Burdge, Jacob U.,	1876	Lehlbach, Paul Frederick,	1872
Campbell, Horace Willard,	1875	Lehn, Louis,	1874
<i>Carle, John, Jr.</i> ,	1860	Macmahan, Thomas Jackson,	1871
Cassebeer, Henry Anthony,	1858	Main, Thomas Francis,	1872
Cassebeer, Henry Adolphus,	1872	Marsh, Edward H.,	1858
Chandler, Charles Frederic,	1867	Massey, George,	1877
Creuse, Jules L. A.,	1871	McIntyre, Byron F.,	1876
<i>Currie, John Harper</i> ,	1858	McIntyre, Ewen,	1878
Davis, Benjamin,	1869	McKesson, John, Jr.,	1867
Day, Walter De Forrest,	1878	Milhau, Edward Leon,	1858
Dege, George Frederick,	1868	<i>Molwitz, Ernest</i> ,	1867
Dick, Dundas,	1879	Morrison, Thomas Ormsby,	1876
Ditman, Andrew J.,	1868	Mortimer, William G.,	1877
Dung, Albert Charles,	1872	Mott, Henry A.,	1879
Eimer, Charles,	1872	Neergaard, William,	1859
<i>Faber, John</i> ,	1857	O'Neil, Henry Maurice,	1879
Fairchild, Benjamin Thomas,	1875	Osmun, Charles A.,	1868
Fisher, William,	1862	Peixotto, Moses Levi Maduro,	1869
Fraser, Edward A.,	1878	Pfingsten, Gustavus,	1878
Frey, John,	1865	Ramsperger, Gustavus,	1860
Fougera, Edmund Charles,	1867	Reichard, Frederick Alfred,	1871
Frohwein, Theobald,	1862	Rice, Charles,	1870
Gardiner, Warren B.,	1860	Ricksecker, Theodore,	1875
Gardner, Robert Winthrop,	1872	Robbins, Charles Albert,	1876
Gilmore, John Wesley,	1867	Robbins, Daniel C.,	1862
Gellatly, William Adams,	1858	Royce, Lucien Merriam,	1866
<i>Gridley, Junius</i> ,	1853	Sands, George Gedney,	1867
Griffith, William Henry,	1874	Scofield, James Stephen,	1867
<i>Hale, Frederick</i> ,	1855	Seabury, George J.,	1876
Hancock, John Henry,	1870	Seward, Daniel W.,	1874
Horner, James Munroe,	1867	Sheddon, John William,	1859
<i>Haviland, Henry</i> ,	1857	Sheils, George E.,	1860
Hays, David,	1867	Skelly, James Joseph,	1866
Hebberling, Gottfried,	1867	Starr, Thomas,	1870
Henes, William Frederic,	1876	Tscheppe, Adolph,	1876
Higgins, James Starkey,	1862	Van der Emde, Reinhold,	1879
Hoffmann, Frederick,	1867	Wanier, George Simon,	1876
Hobenthal, Charles Frederic		Weaver, James,	1860
Leberecht,	1865	Weinman, Oscar Christian,	1878
<i>Hudnut, Alexander</i> ,	1857	Weismann, Augustus William,	1869
Inness, George,	1878	Wellcome, Henry Solomon,	1875
Johnson, Edward L.,	1860	Wenck, George John,	1869

Westerfield, Joseph H., . . .	1858	Rozezlawski, Augustus Josephus, . . .	1879
White, Philip Augustus, . . .	1872	Sayre, Edward Augustus, . . .	1877
Wickham, William Hull, . . .	1870	<i>Snyder, Ambrose Chancellor,</i> . . .	1867
Wilder, Hans Mathias, . . .	1866	Squibb, Edward R., . . .	1858
Wilson, William, . . .	1876	Tartis, Alfred Joseph, . . .	1867
Wohlfarth, Justin, . . .	1879	Ubert, Julius, . . .	1876
Zellhoefer, George, . . .	1876	Underhill, Joseph James, . . .	1879
<i>Brooklyn.</i>			
Althans, Charles Henry, . . .	1878	Vincent, William, . . .	1870
Barnaby, James Otis, . . .	1870	Wendler, Robert, . . .	1876
<i>Bassett, Francis M.,</i> . . .	1860	Wynn, William, . . .	1867
Benjamin, James H., . . .	1878	<i>Albany.</i>	
Bond, Joseph Romulus, . . .	1876	Gaus, Charles H., . . .	1879
Booth, Clarence Frederick, . . .	1875	Husted, Alfred B., . . .	1879
Brooks, George Washington, . . .	1879	Sauter, Louis, . . .	1879
Close, George Cassidy, . . .	1858	<i>Angola, Erie Co.</i>	
Curtiss, Charles Grenville, . . .	1866	Oatman, Le Roy Sunderland, . . .	1872
Cutts, Foxwell Curtis, Jr., . . .	1875	<i>Astoria, L. I.</i>	
Davis, William M., . . .	1879	Vansant, Robert Hays, . . .	1879
Day, Carlos Erastus, . . .	1870	<i>Binghamton.</i>	
Daycock, William Henry, . . .	1874	Inloes, A. J., . . .	1879
De Forrest, William, . . .	1879	<i>Buffalo.</i>	
Dennin, Charles, . . .	1875	Lyman, C. M., . . .	1879
Douglas, Henry, Jr., . . .	1875	<i>Peabody, William Huntington,</i> . . .	1857
Dudley, Oscar E., . . .	1877	Rano, Charles Orlando, . . .	1866
Dunn, John Augustus, . . .	1867	Rieffenstahl, Julius, . . .	1879
<i>Dupuy, Eugene,</i> . . .	1852	Tibbs, William Henry, . . .	1871
Heydenreich, Emile, . . .	1867	<i>Elmira.</i>	
Jones, Thomas, . . .	1868	Holmes, Clay W., . . .	1876
Kitchen, Charles William, . . .	1865	<i>Fishkill on Hudson.</i>	
Krieger, Philip, . . .	1876	<i>Moith, Augustus Theodore,</i> . . .	1860
Lawlor, Charles Johnson, . . .	1874	<i>Flushing.</i>	
Levy, Adolph, . . .	1877	Hepburn, John, . . .	1873
Lewis, Thomas, . . .	1867	<i>Geddes, Onondaga Co.</i>	
Livingston, Barent Van Buren, . . .	1872	Belden, James Lester, . . .	1874
McElhenie, Thomas Diamond, . . .	1872	<i>Glen Cove, Queen's Co.</i>	
Menninger, Henry Joseph, . . .	1866	Finlay, Norman James, . . .	1875
Newman, George Anthony, . . .	1865	<i>Gloversville, Fulton Co.</i>	
Nicot, Louis Edgar, . . .	1875	Miller, Jason A., . . .	1879
<i>Niebrugge, John August,</i> . . .	1861		
Nietsch, Adolph Frederick			
William, . . .	1872		
Ollif, James Henry, . . .	1867		
Owens, Richard J., . . .	1860		
Pyle, Cyrus, . . .	1859		
Raas, Francis, . . .	1877		

<i>Jamaica, L. I.</i>			<i>Rome.</i>		
Goodale, Harvey Galusha,	.	1879	Bissell, John Gordon,	.	1875
Stevens, Luther F.,	.	1879	Broughton, Albert James,	.	1876
<i>Luzerne, Warren Co.</i>			<i>Rondout.</i>		
Miller, George Yerrington,	.	1872	Laycock, Washington,	.	1857
<i>Middletown.</i>			<i>Sag Harbor.</i>		
King, James Theodore,	.	1859	Lobstein, Jacob Fred. Daniel,	.	1868
Rogers, William Henry,	.	1869	Tooker, William Wallace,	.	1879
<i>Mount Vernon.</i>			<i>Saratoga Springs.</i>		
Gill, George,	.	1872	Fish, Charles Frederick,	.	1866
<i>Newburgh.</i>			Gates, Burt Pike,	.	1877
Gorham, John R., Jr.,	.	1879	Gates, Carroll Eugene,	.	1877
<i>New Lebanon.</i>			Mingay James,	.	1878
Tilden, Henry Augustus,	.	1858	Pennington, Thomas Henry		
<i>Niagara Falls.</i>			Sands,	.	1877
Griffith, Hiram Elijah,	.	1875	<i>Spencerport.</i>		
<i>Nyack, Rockland Co.</i>			Milliner, William Seward,	.	1877
De Graff, David,	.	1879	<i>Syracuse.</i>		
<i>Owego.</i>			Dawson, Edward Seymour, Jr.,	.	1876
Napier, Henry B.,	.	1879	Snow, Charles Wesley,	.	1876
<i>Plattsburgh.</i>			<i>Tompkinsville, L. I.</i>		
Cady, Hiram Walworth,	.	1870	Bassett, John William,	.	1875
<i>Port Chester.</i>			<i>Troy.</i>		
Hyer, William Henry,	.	1875	Knowlson, Alexander Master-		
<i>Port Jervis.</i>			ton,	.	1875
Cook, George Edward,	.	1872	Sliter, Albert Hamilton,	.	1875
<i>Potsdam.</i>			<i>Utica.</i>		
Thatcher, Harvey Dexter,	.	1865	Ballard, George Shepard,	.	1874
<i>Poughkeepsie.</i>			Blaikie, William,	.	1879
Brown, George Richard,	.	1876	Howarth, John William,	.	1874
Green, Thomas Townsend,	.	1858	<i>Waterville, Oneida Co.</i>		
Sherwood, Hezekiah,	.	1870	Bissell, Emery Gilbert,	.	1879
<i>Rochester.</i>			<i>Wellsville, Alleghany Co.</i>		
Haas, George Herman,	.	1872	Hall, Edwin Bradford,	.	1879
Lane, Alfred Samuel,	.	1857	<i>Yonkers.</i>		
Paine, James Dixon,	.	1857	Toplis, Robert John,	.	1868

NORTH CAROLINA.							
<i>Beaufort.</i>				Lloyd, John Uri, . . .	1870		
				Merrell, George, . . .	1879		
				<i>Merrell, William Stanley,</i>	1854		
Mace, F. Borden, . . .	1878			Rendigs, Charles Peter, . .	1876		
<i>Chapel Hill.</i>				Reum, Herman Frank, . . .	1864		
<i>Saunders, Richard B.,</i> . .	1858			Thorp, Abner,	1879		
<i>Charlotte.</i>				Wagner, Henry,	1876		
Smith, Thomas C.,	1876			Wayne, Edward S.,	1854		
<i>Fayetteville.</i>				Wells, Jacob David,	1864		
Hinsdale, Samuel Johnston, .	1875			Yorston, Matthew Mackay, .	1864		
<i>Raleigh.</i>				<i>Akron.</i>			
Lee, Addison Sherwin, . . .	1878			Armstrong, Andrew Morehouse,	1876		
Simpson, William,	1878			Foltz, William Kean,	1872		
<i>Tarboro.</i>				Smith, Joseph S.,	1878		
Zoeller, E. V.,	1878			<i>Alliance.</i>			
<i>Washington.</i>				Barr, Peter Herbruck,	1867		
<i>Gallagher, Charles Kewell,</i>	1857			<i>Bellefontaine.</i>			
<i>Wilmington.</i>				Wallace, A. C.,	1879		
Munds, James C.,	1878			<i>Bryan.</i>			
<i>Winston.</i>				Snyder, Alva Leach,	1878		
Smith, Samuel H.,	1879			<i>Chillicothe.</i>			
OHIO.				Howson, Walter Henry,	1875		
<i>Cincinnati.</i>				Nipgen, John A.,	1879		
Bain, Andrew Watson,	1874			<i>Cleveland.</i>			
Eger, George,	1864			Gaylord, Henry Cleveland, . .	1869		
Faust, Charles,	1879			Hartness, William Henry, . .	1872		
Feemster, Joseph Hall,	1873			Hopp, Lewis C.,	1876		
Fennel, Adolphus,	1864			Huling, Bruce,	1872		
Goodman, Emanuel,	1879			Mayell, Alfred,	1872		
Gordon, William John Maclester,	1854			Moore, James Penn,	1872		
Greve, Theodore Lund August,	1864			Scott, William Johnson, . . .	1872		
Heinemann, Otto,	1864			Spencer, Peter Ignatius, . . .	1872		
Helman, Charles Martin, . . .	1864			Vaupel, Charles Peter,	1872		
Hildreth, N. G.,	1879			<i>Columbus.</i>			
Hill, Alfred Charles,	1864			Huston, Charles,	1872		
<i>Hottendorf, Augustus,</i> . . .	1864			<i>Dayton.</i>			
Judge, John French,	1866			Dover, Thomas,	1879		
Karmann, William,	1864			Weusthoff, O. S.,	1879		
Koehnken, Herman Henry, . . .	1875			<i>Fredericktown.</i>			
Keeshan, John,	1864			Jefferson, William E.,	1875		

<i>Ironton.</i>			PENNSYLVANIA.		
Ball, Theophilus Benedict,	.	1874	<i>Philadelphia.</i>		
<i>Logan.</i>			Abell, Walter B.,	.	1867
Harrington, Frank,	.	1869	Angney, John R.,	.	1867
<i>Mansfield.</i>			Bakes, William Courtney,	.	1864
Miller, Charles Meyer,	.	1878	Bauer, Louis Gustavus,	.	1867
<i>Massillon.</i>			Biddle, Charles Johnson,	.	1875
Baltzly, Zachariah Taylor,	.	1876	Blair, Andrew,	.	1865
<i>Middletown.</i>			Blair, Henry Cowen,	.	1868
Johnson, Charles Brayton,	.	1876	Blinkhorn, George,	.	1860
<i>Navarre.</i>			Borell, Henry Augustus,	.	1874
Grossklaus, John Ferdinand,	.	1859	Boring, Edwin McCurdy,	.	1867
<i>Salem, Columbiana Co.</i>			Bossler, David Jervis,	.	1878
Hawkins, Michael Smith,	.	1870	Bower, Henry,	.	1860
Kuhn, Norman A.,	.	1878	Bower, Henry Albert,	.	1868
<i>Sandusky.</i>			Bowker, James,	.	1876
Graham, William A.,	.	1876	Bullock, Charles,	.	1857
<i>South Charleston.</i>			Bunting, Samuel Sellers,	.	1857
Armstrong, George Revington,	1877		Campbell, Hugh,	.	1876
<i>Springfield.</i>			Campbell, Samuel,	.	1864
Casper, Thomas Jefferson,	.	1867	Cook, Thomas Penrose,	.	1877
Ludlow, Charles,	.	1872	Coombe, Thomas Roberson,	.	1860
Smith, Charles August,	.	1874	Cramer, Henry,	.	1867
Stout, William Andrew,	.	1875	Dobbins, Edward Tompkins,	.	1867
<i>Toledo.</i>			Eberle, Charles Louis,	.	1865
Hohley, Charles,	.	1872	Eddy, Henry Clay,	.	1869
<i>Troy.</i>			Eldridge, George Washington,	.	1865
Tobey, Charles W.,	.	1879	Ellis, Evan Tyson,	.	1857
<i>Wooster.</i>			England, Robert,	.	1868
Ohliger, Lewis Philip,	.	1871	Erben, John Singer,	.	1868
<i>Zanesville.</i>			Fox, Peter Paul,	.	1869
Hatton, Edgar Melville,	.	1878	Früh, Carl D. S.,	.	1876
OREGON.			Gaillard, Edward,	.	1876
<i>Portland.</i>			Genois, Louis,	.	1876
Hodge, Charles,	.	1859	Gerhard, Samuel,	.	1878
Sitton, Charles Edward,	.	1878	Grahame, Israel Janney,	.	1856
			Grove, John Eberly,	.	1868
			Haenchen, Charles Eugene,	.	1865
			Hance, Edward H.,	.	1857
			Hancock, Charles West,	.	1868
			Hazlett, Edward Everett,	.	1876
			Heintzelman, Joseph Augustus,	.	1858
			Hurst, John Corry,	.	1868
			Jenks, William J.,	.	1858
			Johnson, Benjamin Franklin,	.	1859
			Jones, Alexander Henry,	.	1874

Jones, Daniel Sexton, . . .	1859	Shryock, Allen, . . .	1868
Jones, Edward Charles, . . .	1864	Simpers, John Wilmer, . . .	1874
Kay, Isaac Henry, . . .	1870	Snowdon, George Miles, . . .	1857
Keasbey, Henry Griffith, . . .	1878	Spannagel, Charles Christian, . . .	1874
Keeney, Caleb Reynolds, . . .	1868	Taylor, Alfred Bower, . . .	1852
Keys, Roger, . . .	1868	Taylor, Henry Burnes, . . .	1876
Kline, Mahlon Norwood, . . .	1876	<i>Thompson, William Beatty,</i> . . .	1858
Koch, Louis, . . .	1872	Trimble, Henry, . . .	1876
Krewson, William Egbert, . . .	1875	<i>Troth, Samuel Fothergill,</i> . . .	1857
Lippincott, Henry Bascom, . . .	1868	Vogelbach, Hermann Augustus, . . .	1868
Magill, Benjamin Morris, . . .	1876	Walsh, Robert H., . . .	1879
MAISCH, JOHN M., . . .	1856	<i>Warner, William Richard,</i> . . .	1857
Mattern, William Kline, . . .	1876	Warrington, Charles W., . . .	1876
Mattison, Richard Vornsolons, . . .	1878	Weaver, J. Thornton, . . .	1868
McIntyre, William, . . .	1868	Webb, William H., . . .	1867
McKelway, George Irvin, . . .	1874	Weber, William, . . .	1872
<i>Mellor, Alfred,</i> . . .	1864	Weidemann, Charles Alexander, . . .	1868
Miller, Adolphus William, . . .	1868	Wendel, Henry Edward, . . .	1878
Milligan, Decatur, . . .	1867	Wiegand, Thomas Snowdon, . . .	1857
Mitchell, Charles Lippincott, . . .	1874	<i>Wilson, Adam Hill,</i> . . .	1859
Moore, Joachimi Bonaparte, . . .	1860	Wright, Archibald Wesley, . . .	1868
Moorhead, William Walker, . . .	1876	Zeilin, John Henry, . . .	1859
Murray, Francis Marion, . . .	1876		
Needles, Caleb H., . . .	1868	<i>Alleghany City.</i>	
Newbold, Thomas Mitchell, . . .	1876	Eggers, Frederick Hermann, . . .	1872
Ottinger, James Jeremiah, . . .	1876		
Parrish, Clemmons, . . .	1868	<i>Beaver, Beaver Co.</i>	
<i>Parrish, Dillwyn,</i> . . .	1857	Andriessen, Hugo, . . .	1875
Patterson, James Lemon, . . .	1876		
<i>Perot, Thomas Morris,</i> . . .	1857	<i>Bethlehem.</i>	
Pile, Wilson H., . . .	1867	Luckenback, Edward Hermann, . . .	1870
Post, Elisha, . . .	1876	Meyers, Edward Tobias, . . .	1867
Preston, David, . . .	1868		
Procter, Wallace, . . .	1874	<i>Carlisle.</i>	
Remington, Joseph Price, . . .	1867	Horn, Wilbur Fisk, . . .	1876
Riley, Charles William, . . .	1868		
<i>Rittenhouse, Henry Norman,</i> . . .	1857	<i>Chambersburg.</i>	
Robbins, Alonzo, . . .	1865	Cressler, Charles Henry, . . .	1868
Roche, Edward Manning, . . .	1868		
Roche, William Ford, . . .	1868	<i>Columbia.</i>	
Rosengarten, Mitchell George, . . .	1869	Meyers, James Alfred, . . .	1867
Scattergood, George James, . . .	1860		
Selfridge, Matthew Merthirall, . . .	1858	<i>Danville.</i>	
Shaw, Louis, . . .	1877	Sechler, James C., . . .	1878
Shivers, Charles, . . .	1860		
Shinn, James Thornton, . . .	1860	<i>Easton.</i>	
Shoemaker, Joseph Leybrand, . . .	1867	Weaver, John Archibald, . . .	1878
Shoemaker, Richard Martin, . . .	1869		

<i>Erie.</i>		<i>Pottsville.</i>	
Nick, William Frederick, Jr.,	1869	Kennedy, George Washington,	1869
<i>Harrisburg.</i>		<i>Quakertown.</i>	
Finney, Thomas Jefferson,	1874	Penrose, Stephen F.,	1871
George, Charles Theodore,	1878	<i>Reading.</i>	
Miller, Jacob Augustus,	1878	Raser, John Bernard,	1872
<i>Hyde Park, Luzerne Co.</i>		Stein, Jacob Henry,	1869
Morgan, Benjamin George,	1876	Ziegler, Philip Milton,	1867
<i>Lancaster.</i>		<i>Tamaqua.</i>	
Heinitsh, Charles Augustus,	1857	Albrecht Emil,	1875
<i>Lebanon.</i>		<i>West Chester.</i>	
Karch, Joseph Jacob,	1876	Evans, Joseph Spragg,	1877
Lemberger, Joseph Lyon,	1858	<i>Wilkesbarre.</i>	
Ross, George,	1878	Wolfe, Nathaniel,	1878
<i>Lewisburg, Union Co.</i>		<i>Williamsport.</i>	
Schaffle, Samuel Wilson Wykoff,	1876	Cornell, Edward Augustus,	1878
<i>Marietta.</i>		Duble, Jesse Balderston,	1870
Wike, Albert Davis,	1876	RHODE ISLAND.	
<i>Minersville.</i>		<i>East Greenwich.</i>	
Burns, John Kellar,	1876	Congdon, Albert James,	1860
<i>New Brighton.</i>		<i>Newport.</i>	
Walker, F. W., Jr.,	1878	Blackman, Lyman Rawson,	1865
<i>Oil City.</i>		Taylor, James Henry,	1875
Griffith, Albert Richard,	1870	<i>Providence.</i>	
Griffith, Alphonso de Lamar-	1879	Blanding, William Bullock,	1875
tine,		Boutelle, William Eugene,	1876
<i>Pittsburg.</i>		Calder, Albert Layton,	1859
Abel, Joseph,	1864	Cone, John Wright,	1876
Cherry, James Bonbright,	1868	Mason, Norman Nelson,	1875
Emanuel, Louis,	1878	Reynolds, William Keyes,	1876
Holland, Samuel Smith,	1876	<i>Westerley.</i>	
Hostetter, Charles Michael,	1870	Latimer, Robert Fulton,	1857
Kerr, James, Jr.,	1876	<i>Wyoming.</i>	
<i>Pittston.</i>		Greene, George E.,	1875
Rhoades, Stephen Howard,	1876	SOUTH CAROLINA.	
<i>Pleasantville, Venango Co.</i>		<i>Aiken.</i>	
Hatch, Frederick Albert,	1876	Harbers, William Henry,	1875

<i>Charleston.</i>			<i>Galveston.</i>		
Aimar, Charles Pons, . . .	1879		Voelcker, Rudolph, . . .	1878	
Burnham, Edward S., . . .	1874				
Eckel, Augustus W., . . .	1874		<i>San Antonio.</i>		
Gibson, William Andrew, . . .	1874		Elbe, Constantine Berthold, . . .	1877	
Luhn, Gustavus Johann, . . .	1878				
Michaelis, Charles Otto, . . .	1874		<i>Terrill.</i>		
Moise, Benjamin Franklin, . . .	1876		Brown, Charles Scott, . . .	1878	
Panknin, Charles Frederick, . . .	1874				
<i>Columbia.</i>			VERMONT.		
Heinitsh, Edward H., . . .	1877		<i>Brandon.</i>		
TENNESSEE.			Grossman, George Alvin, . . .	1872	
<i>Bolivar.</i>			<i>Burlington.</i>		
Larwill, Joseph H., Jr., . . .	1858		Van Patten, William James, . . .	1876	
<i>Knoxville.</i>			<i>Chester.</i>		
Albers, George William, . . .	1872		Pierce, Frank Webster, . . .	1879	
<i>Memphis.</i>			<i>Ludlow.</i>		
Fahlen, James, . . .	1876		Sherman, Linus Etius, . . .	1875	
Hoerner, Theodore, . . .	1871		<i>Rutland.</i>		
Robinson, James Scott, . . .	1869		Higgins, Albert Warren, . . .	1870	
Safford, William Burr, . . .	1875		Lewis, Elam Clark, . . .	1870	
<i>Nashville.</i>			<i>St. Johnsbury.</i>		
Haddox, James Bowling, . . .	1876		Bingham, Charles Calvin, . . .	1875	
Laurent, Eugene L., . . .	1872		Randall, George Dallas, . . .	1875	
Thomas, James, Jr., . . .	1875		<i>Vergennes.</i>		
Wharton, John Criddle, . . .	1872		Young, John Edward, . . .	1875	
Wharton, William Henry, . . .	1876		<i>Windsor.</i>		
TEXAS.			Paine, William Kendall, . . .	1875	
<i>Austin.</i>			VIRGINIA.		
Lindemann, Herman Ernst, . . .	1878		<i>Fredericksburg.</i>		
Morley, William Jarman, . . .	1876		Hall, Marshall Carter, . . .	1870	
<i>Corsicana.</i>			<i>Harrisonburg.</i>		
Campbell, J. G., . . .	1879		Avis, James Little, . . .	1878	
<i>Dallas.</i>			<i>Lynchburg.</i>		
Connor, Lewis Myers, . . .	1874		Lumsden, Charles Harris, . . .	1875	
<i>Fort Worth.</i>			Strother, William Alexander, . . .	1874	
Powell, Thomas Wallace, . . .	1874				
Wells, Ebenezer Miller, . . .	1878				

<i>Norfolk.</i>			WEST VIRGINIA.		
Addington, William B.,	.	1878	<i>Charlestown.</i>		
Masi, Frederick Henry,	.	1878	Boggs, Edwin Leslie,	.	1872
<i>Petersburg.</i>			<i>Wheeling.</i>		
Goodwyn, John W.,	.	1878	Bocking, Edmund,	.	1874
			Young, Alexander Thomas,	.	1876
<i>Richmond.</i>			WISCONSIN.		
Anthony, Joseph,	.	1878	<i>Geneva Lake.</i>		
Baker, Thomas Roberts,	.	1878	Arnold, R. Bruce,		
Blunt, Ira Washington,	.	1878			
Bodeker, Henry,	.	1878	<i>Janesville.</i>		
Dupuy, Powhatan Eldridge,	.	1878	Heimstreet, Edward Burton,	.	1874
Meade, Richard Hardaway,	.	1878	Prentice, Fred. F.,	.	1876
Miller, Polk,	.	1876	<i>Maxomanie.</i>		
Nesbitt, Charles Albert,	.	1878	Senier, Frederick S.,	.	1874
Nolting, Adolphus William, Jr.,	1870		<i>Milwaukee.</i>		
Purcell, John Barry,	.	1875	Drake, John Ransom,	.	1860
Scott, Albert Augustus,	.	1878	Schrank, Henry Charles,	.	1876
Scott, William Henry,	.	1878	<i>Watertown.</i>		
Taliaferro, Edwin Conway,	.	1876	Eberle, Herman Theodore,	.	1875
Willis, Joseph Normont,	.	1878			
<i>Unionville, Orange Co.</i>					
Chipman, Edward Dyer,	.	1872			

DOMINION OF CANADA.

NOVA SCOTIA.			<i>Toronto.</i>		
<i>Halifax.</i>			Elliott, William,	.	1877
Simson, Francis Cook,	.	1876	Harvey, Edmund,	.	1877
ONTARIO.			Henderson, John,	.	1877
<i>Goodrich.</i>			Hodgetts, George,	.	1877
Jordan, Frederick Francis,	.	1877	Knowles, Harvey Armage,	.	1877
<i>Guelph.</i>			Lander, John Cambridge,	.	1877
Petrie, Alexander Bain,	.	1867	Robinson, William Sherlock,	.	1877
<i>Lindsay.</i>			Rose, Henry John,	.	1872
Gregory, Edmund,	.	1875	Shuttleworth, Edward Buck-		
<i>London.</i>			ingham,	.	1877
Bowman, James,	.	1876	QUEBEC.		
Saunders, William,	.	1860	<i>Montreal.</i>		
<i>Stratford.</i>			Giroux, Edmund,	.	1878
Waugh, George James,	.	1862	Gray, Henry Robert,	.	1867
			Lowden, John,	.	1875
			Lyman, Stephen Jones,	.	1875

BERMUDA.

Hamilton.

Heyl, James B., . . . 1868

U. S. OF COLOMBIA.

Panama.

Herbruger, Florence C., . . 1876

MEMBERS RESIDING IN EUROPE.

Burroughs, Silas Mainvielle, London, England,	.	.	.	1876
Cohen, Louis S., Paris, France,	.	.	.	1877
Lindewald, Wilhelm Edward, Paris, France,	.	.	.	1877
Power, Frederick Belding, Strassburg, Germany,	.	.	.	1872

ALPHABETICAL LIST OF ACTIVE MEMBERS.

- | | |
|---|--|
| <p>Abel, Joseph, cor. Fifth avenue and Grant street, Pittsburg, Pa.</p> <p>Abell, Russell, Harrodsburg, Mercer County, Ky.</p> <p>Abell, Walter B., cor. Frankford and Girard avenues, Philadelphia, Pa.</p> <p>Abernethy, Maxwell, No. 188 Newark avenue, Jersey City, N. J.</p> <p>Aimar, Charles P., Charleston, S. C.</p> <p>Addington, William B., Norfolk, Va</p> <p>Ahlbrandt, Henry E., S. E. cor. Fifteenth and Cass streets, St. Louis, Mo.</p> <p>Adams, Hazen W., Hackensack, N. J.</p> <p>Albers, George W., Market Square, Knoxville, Tenn.</p> <p>Albrecht, Emil, Tamaqua, Pa.</p> <p>Alden, Charles P., No. 270 Main street, Springfield, Mass.</p> <p>Alexander, Maurice W., S. E. cor. Fourth and Market streets, St. Louis, Mo.</p> <p>Alsdorf, John, No 612 Tenth avenue, New York City, N. Y.</p> <p>Althans, Charles H., No. 191 Fulton street, Brooklyn, N. Y.</p> <p>Ambler, Starr Hoyt, No. 36 Vesey street, New York.</p> <p>Anderson, Samuel, No. 48 Front street, Bath, Me.</p> <p>Andrews, Josiah H., Seymour, Ind.</p> <p>Andriessen, Hugo, P. O. Box 89, Beaver, Beaver County, Pa.</p> <p>Angney, John R., cor. Fifth and Spruce streets, Philadelphia, Pa.</p> <p>Anthony, Joseph, No. 10 East Broad street, Richmond, Va.</p> | <p>Appleton, George J., P. O. Box 959, Keene, N. H.</p> <p>Armstrong, Andrew M., No. 106 East Market street, Akron, O.</p> <p>Armstrong, George R., South Charleston, O.</p> <p>Arnold, R. Bruce, Geneva Lake, Wisconsin.</p> <p>Ash, Matthew F., P. O. Box 129, Jackson, Miss.</p> <p>Atkinson, Albert J., cor. State and Pleasant streets, Newburyport, Mass.</p> <p>Atwood, Herman W., No. 856 Broadway, New York.</p> <p>Atwood, Luther L., No. 7 North street, Pittsfield, Mass.</p> <p>Austin, George W., No. 6 South Front street, Jackson, Mich.</p> <p>Avary, Arch., Atlanta, Ga.</p> <p>Averill, William H., Frankfort, Ky.</p> <p>Avis, James L., near Masonic Temple, Harrisonburg, Va.</p> <p>Babo, Leopold, No. 12 Boylston street, Boston, Mass.</p> <p>Bailey, Frederick, P. O. Box 814, Lowell, Mass.</p> <p>Bain, Andrew W., City Hospital, Cincinnati, O.</p> <p>Baker, Edwin, Bridge street, Shelbourne Falls, Mass.</p> <p>Baker, T. Roberts, No. 919 East Main street, Richmond, Va.</p> <p>Bakes, William C., 145 N. Tenth street, Philadelphia, Pa.</p> <p>Baldus, William T., No. 1901 Pennsylvania avenue, Washington, D. C.</p> |
|---|--|

- Ball, Theophilus B., No. 105 Second street, Ironton, O.
- Ballard, George S., No. 198 Genesee street, Utica, N. Y.
- Ballard, John W., No. 106 West Second street, Davenport, Iowa.
- Balluff, Paul, No. 655 Sixth avenue, New York.
- Balser, Gustavus, No. 137 Avenue B, New York.
- Baltzly, Zacharias T., Opera Block, Massillon, O.
- Bang, Charles, No. 1429 Franklin avenue, St. Louis, Mo.
- Bannwart, Charles A.*, Treasury Department, Washington, D. C.
- Barnaby, James O., No. 700 Fulton street, Brooklyn, N. Y.
- Barnaby, Thomas J., No. 166 Broad street, Elizabeth, N. J.
- Barr, Peter H., Main street, Alliance, Ohio.
- Barry, Daniel E., No. 373 West Broadway, Boston, Mass.
- Barthels, Joseph, Indianapolis, Indiana.
- Bartlett, Nicholas G., N. W. cor. Twenty-third street and Indiana avenue, Chicago, Ill.
- Bartlett, William W., No. 189 High street, Boston, Mass.
- Bassett, Charles H., No. 504 Washington street, Boston, Mass.
- Bassett, Francis M.*, cor. Atlantic avenue and Court street, Brooklyn, N. Y.
- Bassett, John W., Tomkinsville, L. I., N. Y.
- Bauer, Louis G., cor. Fifth and Fairmount avenue, Philadelphia, Pa.
- Baur, Jacob, Terre Haute, Ind.
- Baxley, J. Brown, cor. Howard and Franklin streets, Baltimore, Md.
- Bayley, Augustus R., No. 607 Main street, Cambridgeport, Mass.
- Böcker, Charles, No. 138 High street, Georgetown, D. C.
- Beckmann, Oscar A., Louisville, Ky.
- Bedford, P. Wendover, No. 10 Gold street, New York.
- Belden, James L., cor. Genesee and Furnace streets, Geddes, N. Y.
- Bell, Alexander C., Chicago, Ill.
- Belt, Z. James, No. 601 Market street, Wilmington, Del.
- Benjamin James H., No. 493 Tompkins avenue, Brooklyn, N. Y.
- Berrian, George W., Jr.*, No. 1507 H street, N. W., Washington, D. C.
- Best, John, No. 1 German Block, Central City, Col.
- Biddle, Charles Johnson, No. 3348 Market Street, Philadelphia.
- Billings, Henry M., No. 278 Greenwich street, New York.
- Bingham, Charles C., No. 5 Bank Block, Main street, St. Johnsbury, Vt.
- Biroth, Henry, No. 111 Archer avenue, Chicago, Ill.
- Bischof, Albert S., No. 84 First avenue, New York.
- Bissell, Emery G., Waterville, Oneida County, N. Y.
- Bissell, John G., Rome, N. Y.
- Blackman, Lyman R., No. 167 Thames street, Newport, R. I.
- Blaikie, William, Utica, N. Y.
- Blair, Andrew, cor. Eighth and Walnut streets, Philadelphia, Pa.
- Blair, Henry C., cor. Eighth and Walnut streets, Philadelphia, Pa.
- Blake, James E., No. 64 North Second street, New Bedford, Mass.
- Blanding, William B., Nos. 54 and 58 Wey Vessel street, Providence, R. I.
- Blank, Alois, No. 1353 South Fifth street, St. Louis, Mo.
- Blatchford, Eben*, No. 82 Main street, Rockport, Mass.
- Blatterman, George W., Maysville, Ky.
- Blinkhorn, George, S. E. cor. Chestnut and Tenth streets, Philadelphia, Pa.

- Blocki, William F., No. 85 South Clark street, Chicago, Ill.
- Blunt, Ira W., Inner Court, between Eleventh and Twelfth, and Main and Cary streets, Richmond, Va.
- Bocking, Edmund, No. 1 Odd Fellows' Hall, Wheeling, W. Va.
- Bodeker, Henry, cor. Fifteenth and East Main streets, Richmond, Virginia.
- Boehm, Solomon, No. 800 Morgan street, St. Louis, Mo.
- Boerner, Emil L., Haas Block, Clinton street, Iowa City, Ia.
- Boggs, Edwin L., Kanawha Bank Building, Charlestown, W. Va.
- Bolles, William P., No. 571 Dudley street, Boston, Mass.
- Bond, Joseph R., No. 252 Twelfth street, Brooklyn, N. Y.
- Booth, Clarence F., No. 128 Hall street, Brooklyn, N. Y.
- Borell, Henry A., No. 2048 Chestnut street, Philadelphia, Pa.
- Boring, Edwin M., cor. Tenth and Fairmount avenue, Philadelphia, Pa.
- Borland, Matthew W., No. 378 West Van Buren street, Chicago, Ill.
- Boessler, David J., No. 5186 Germantown avenue, Philadelphia, Pa.
- Boutelle, William E., No. 28 Market street, Providence, R. I.
- Bower, Henry, cor. Gray's Ferry road and Twenty-ninth street, Philadelphia, Pa.
- Bower, Henry A., cor. Sixth and Green streets, Philadelphia, Pa.
- Bowker, James, cor. Sixth and Vine streets, Philadelphia, Pa.
- Bowman, James H., No. 188 Dundas street, London, Ont., Can.
- Boyce, Samuel F., west side of Public Square, Chillicothe, Mo.
- Boyden, Edward C., cor. of Joy and Myrtle streets, Boston, Mass.
- Boynton, Herschell, No. 74 Main street, Biddeford, Maine.
- Brack, Charles, cor. Ensor and Forrest streets, Baltimore, Md.
- Brackett, Aurick S., Tenth and Broadway, Kansas City, Mo.
- Bradfield, L. H., Atlanta, Ga.
- Brandon, John F., Anderson, Ind.
- Brigham, Wm. C., Railroad Square, Medford, Mass.
- Brooks, F. M., Baton Rouge, La.
- Brooks, George W., 1161 Myrtle avenue, Brooklyn, N. Y.
- Broughton, Albert J., No. 64 Dominick street, Rome, N. Y.
- Brown, Alexander E., No. 25 Sharp street, Baltimore, Md.
- Brown, Albert P., cor. Fifth and Federal streets, Camden, N. J.
- Brown, Charles S., care of A. D. Edwards, Terrell, Texas.
- Brown, George R., Poughkeepsie, N. Y.
- Brown, Joseph J., P. O. Box 1812, San Jose, Cal.
- Brown, Joseph T., No. 504 Washington street, Boston, Mass.
- Brown, Joseph T., Jr., No. 504 Washington street, Boston, Mass.
- Brown, William H., No. 25 Sharp street, Baltimore, Md.
- Bruguier, Francis, No. 557 Market street, Newark, N. J.
- Brumby, Richard T., Athens, Ga.
- Brunner, Norman I., Macon, Ga.
- Buck, Albert B., Anderson, Ind.
- Buck, George, S. W. cor. State and Madison streets, Chicago, Ill.
- Buck, John, Nos. 104 and 106 Winisimmet street, Chelsea, Mass.
- Buehler, Edward H., No. 170 William street, New York.
- Bullard George S., No. 98 Genesee street, Utica, N. Y.
- Bullock, Charles, No. 528 Arch street, Philadelphia, Pa.
- Buntin, William C., No. 600 Main street, Terre Haute, Ind.
- Bunting, Samuel S., cor. Tenth and Spruce streets, Philadelphia, Pa.

- Burbank, George G., No. 221 Main street, Worcester, Mass.
- Burdge, Jacob U., No. 482 Seventh avenue, New York.
- Burge, J. O., Bowling Green, Ky.
- Burley, Edwin P., No. 48 Temple Place, Boston, Mass.
- Burnett Joseph*, No. 27 Central street, Boston, Mass.
- Burnham, Edward S., Charleston, S. C.
- Burns, J. Kellar, cor. Sunbury and Lecona streets, Minersville, Pa.
- Burroughs, Silas M., 8 Snowhill, London, England.
- Bury, Edward B., No. 412 Eighth street, S. E., Washington, D. C.
- Bush, William, No. 56 Front street, Worcester, Mass.
- Butler, Freeman H., No. 141 Central street, Lowell, Mass.
- Butler, Osceola, Savannah, Ga.
- Button, Elijah, No. 40 Hanover street, Annapolis, Md.
- Cady, Hiram W., No. 74 Margaret street, Plattsburg, N. Y.
- Calder, Albert L., No. 168 Westminster street, Providence, R. I.
- Caldwell, James W., No. 242 Grand River avenue, Detroit, Mich.
- Calvert, John, S. E. cor. Kearny and Clay streets, San Francisco, Cal.
- Campbell, Horace W., No. 84 Front street, New York.
- Campbell, Hugh, cor. Twenty-first and Locust streets, Philadelphia, Pa.
- Campbell, Isaac T., No. 239 West Broadway, Boston, Mass.
- Campbell, J. G., Corsicana, Texas.
- Campbell, Samuel, No. 1412 Walnut street, Philadelphia, Pa.
- Campbell, William P., Cumberland, Maryland.
- Candidus, Philip C., cor. Dauphin and Cedar streets, Mobile, Ala.
- Candler, Asa G., Atlanta, Ga.
- Canning, Henry, No. 90 Green street, Boston, Mass.
- Carle, John, Jr.*, No. 158 Water street, New York.
- Carrell, Eugene A., Washington street, Morristown, N. J.
- Carter, Solomon, No. 355 Washington street, Boston, Mass.
- Casper, Thomas J., No. 41 East Main street, Springfield, O.
- Cassebeer, Henry A., No. 57 Fourth avenue, New York.
- Cassebeer, Henry A., Jr., No. 57 Fourth avenue, New York.
- Catlin Ephron, cor. Sixth street and Washington avenue, St. Louis, Mo.
- Catlin, Theron, cor. Sixth street and Washington avenue, St. Louis, Mo.
- Chamberlain, Guilford T., N. E. cor. Ninth and Chambers streets, St. Louis, Mo.
- Chandler, Charles F., cor. Fourth avenue and Fiftieth street, New York.
- Cherry, James B., No. 28 Fourth avenue, Pittsburg, Pa.
- Chipman, Edward D., Unionville, Orange County, Va.
- Choate, John, No. 208 Main street, Fitchburg, Mass.
- Christiani, Charles, No. 484 Pennsylvania avenue, Washington, D. C.
- Clark, Albert B., Jr., No. 9 Main street, Galesburg, Ill.
- Clark, John M., Milledgeville, Ga.
- Close, George C., cor. Smith and Schermerhorn streets, Brooklyn, N. Y.
- Coffin, Samuel L., Chicago, Ill.
- Cohen, Louis S., No. 1 Rue de Havre, Paris, France.
- Colby, Frank A., Lancaster, New Hampshire.
- Colcord, Samuel M.*, Dover, Mass.
- Colgan, John, cor. Tenth and Walnut streets, Louisville, Ky.
- Colton, James B., No. 766 Tremont street, Boston, Mass.
- Cone, John W., No. 52 Wey Vossel street, Providence, R. I.
- Congdon Albert J., Main street, East Greenwich, R. I.

- Conner, Jefferson S., No. 121 Pearl street, New Albany, Ind
- Conner, L. Myers, No. 502 Main street, Dallas, Texas.
- Coombe, Thomas R., No. 3928 Market street, Philadelphia, Pa.
- Cook, George E., No. 111 Pike street, Port Jervis, N. Y.
- Cook, Thomas P., No 838 North Ninth street, Philadelphia, Pa.
- Cornell, Edward A., cor. Pine and Tenth streets, Williamsport, Pa.
- Cotting, William A., Milledgeville, Georgia.
- Courtney, W. T. Owensboro, Ky.
- Covell, Thomas J., No. 38 Tennyson street, Boston, Mass.
- Cowdin, George H., No. 25 Union Square, Somerville, Mass.
- Cowdrey, Robert H., Chicago, Ill.
- Craig, John S., Neponset avenue, Neponset, Boston, Mass.
- Cramer, Henry, No. 320 Race street, Philadelphia, Pa.
- Crawford, William H., No. 800 Washington avenue, St. Louis, Mo.
- Crawley, Francis X., No. 2301 Carr street, St. Louis, Mo.
- Cressler, Charles H., S. W. cor. Front and Main streets, Chambersburg, Pa.
- Creuse, Jules L. A., No. 42 Pine street, New York.
- Cromwell, Zachariah S., No. 480 Pennsylvania avenue, Washington, D. C.
- Crossman, George A., No. 2 Simonds's Block, Brandon, Vt.
- Cummings, Henry T.*, No. 696 Congress street, Portland, Me.
- Currie, John H.*, No. 206 East Twenty-ninth street, New York.
- Curry, David W., Cartersville, Ga.
- Curtis, Lebbens, Searsport, Me.
- Curtiss, Charles G., No. 833 De Kalb avenue, Brooklyn, N. Y.
- Curtman, Charles O., No. 8718 North Ninth street, St. Louis, Mo.
- Cutler, Edward Waldo, No. 89 Broad street, Boston, Mass.
- Cutts, Foxwell C., Jr., No. 965 Fulton street, Brooklyn, N. Y.
- Dalrymple, Charles H., Washington street, Morristown, N. J.
- Dana, Edmund, Jr., No. 373 Congress street, Portland, Me.
- Danforth, Edmund C., Cambridgeport, Mass.
- Daniels, John B., No. 13 Decatur street, Atlanta, Ga.
- Daniels, Samuel O., cor. Main and Summer streets, Natick, Mass.
- Davenport, Bennett F., No. 751 Tremont street, Boston, Mass.
- Davis, Benjamin, No. 466 Grand street, New York.
- Davis, Vincent, cor. Sixth and Chestnut streets, Louisville, Ky.
- Davis, William M., No. 689 De Kalb avenue, Brooklyn, N. Y.
- Dawson, Edward S., Jr., No. 13 South Salina street, Syracuse, N. Y.
- Day, Carlos E., No. 1002 Broadway, Brooklyn, N. Y.
- Day, Walter D., No. 56 East Thirty-fourth street, New York.
- Daycock, William H., No. 649 Bedford Avenue, Brooklyn, N. Y.
- De Forest, William P., Fifth avenue cor. Dean street, Brooklyn, N. Y.
- De Graff, David, Nyack, Rockland Co., N. Y.
- De Puy, Caspar E., Chelsea, Mich.
- Dearborn, George L.*, No. 156 Main street, New Market, N. H.
- Dege, George F., No. 238 Third street, New York.
- Delavallade, John M., Plaquemines, Louisiana.
- Deléry, Edgar, Bay St. Louis, Mississippi.
- Denham, Charles S., East Pepperell Mass.
- Dennin, Charles, No. 33 Court street, Brooklyn, N. Y.
- Dick, Dundas, 37 Wooster street, N. Y.
- Diehl, C. Lewis, cor. Third and Broadway, Louisville, Ky.

- Dikeman, Nathan, cor. Leavenworth and Dikeman streets, Waterbury, Ct.
- Dill, J. B., Indianapolis, Ind.
- Dimock, Robert H., New Haven, Ct.
- Dinsmore, George F., 41 Park street, Worcester, Mass.
- Ditman, Andrew J., No. 10 Astor House, New York.
- Dobbins, Edward T., No. 1412 Walnut street, Philadelphia, Pa.
- Dohme, Charles E., cor. Pratt and Howard streets, Baltimore, Md.
- Dohme, Louis, cor. Pratt and Howard streets, Baltimore, Md.
- Doliber, Thomas, No. 89 Tremont street, Boston, Mass.
- Donnell, J. Woodbury, No. 12 Main street, Richmond, Me.
- Donavin, Matthew W., cor. Lee and Sharp streets, Baltimore, Md.
- Dougherty, Samuel E., No. 68 Wythe avenue, Jersey City, N. J.
- Douglass, Henry, Jr., Brooklyn, N. Y.
- Dover, Thomas, Dayton, O.
- Drake, Charles W., Middleboro, Mass.
- Drake, Jonathan B., No. 182 Broad street, Elizabeth, N. J.
- Drake, John R., No. 255 S. Water street, Milwaukee, Wis.
- Drake, Robert S., station 6, Elleandville, St. Louis, Mo.
- Dreher, Ernest, No. 958 Broad street, Newark, N. J.
- Drew, John W., No. 901 Pennsylvania avenue, Washington, D. C.
- Drury, Linus D., cor. Warren and Dudley streets, Boston, Mass.
- Dryer, James W., No. 844 East Washington street, Indianapolis, Ind.
- Duble, Jesse B., cor. Pan and Fourth streets, Williamsport, Pa.
- Duckett, Walter G., cor. Twenty-second street and Pennsylvania avenue, Washington, D. C.
- Dudley, Oscar E., No. 428 Fulton street, Brooklyn, N. Y.
- Dufour, Clarence R., No. 1814 Fourteenth street, Washington, D. C.
- Dung, Albert C., No. 61 Bowery, New York.
- Dunn, John A., No. 56 Dougherty street, Brooklyn, N. Y.
- Dupuy, Eugene, No. 420 Van Brunt street, Brooklyn, N. Y.
- Dupuy, Powhatan E., No. 47 East Broad street, Richmond, Va.
- Dyson, Dunbar S., Bloomington, Ill.
- Eareckson, Edwin, cor. Baltimore and High streets, Baltimore, Md.
- Eastman, Charles S., N. E. cor. Main and Depot streets, Concord, N. H.
- Easton, Luther W., Union near Webster street, Rockland, Mass.
- Eaton, Charles I., No. 1433 Washington street, Boston, Mass.
- Eberbach, Ottmar, No. 12 South Main street, Ann Arbor, Mich.
- Eberle, Charles L., No. 4779 Germantown avenue, Philadelphia, Pa.
- Eberle, Herman T., care G. E. Eberle & Son, Watertown, Wis.
- Ebert, Albert E., Chicago, Ill.
- Eckel, Augustus W., Charleston, S. C.
- Eddy, Henry C., cor. Eighteenth and Lombard streets, Philadelphia, Pa.
- Edwards, Nathan W., Fairmount, Ind.
- Eger, George, No. 839 and 841 Central avenue, Cincinnati, O.
- Eggers, Frederick H., No. 192 Ohio street, Alleghany City, Pa.
- Eimer, Charles, No. 205 Third avenue, New York.
- Elbe, Constantine B., cor. Houston and Losoya streets, San Antonio, Texas.
- Eldridge, George W., cor. Seventh and Thompson streets, Philadelphia, Pa.
- Elliot, William, No. 8 Front street, East Toronto, Can.
- Elliott, Henry A., No. 286 Lexington street, Baltimore, Md.
- Ellis, Evan T., No. 133 S. Front street, Philadelphia, Pa.
- Ellis, William L. A., Hawkinsville, Pulaski County, Ga.

- Emanuel, Louis, cor. 2d and Grant streets, Pittsburg, Pa.
- Emich, Columbus V., No. 186 North Howard street, Baltimore, Md.
- England, Robert, No. 800 South Tenth street, Philadelphia, Pa.
- Entwisle, William B., No. 1201 Pennsylvania avenue, Washington, D. C.
- Erben, John S., No. 1200 Vine street, Philadelphia, Pa.
- Estes, Joseph, cor. Union and Church streets, Rockland, Mass.
- Evans, Joseph S., P. O. Box 657, West Chester, Pa.
- Faber, John*, No. 990 Sixth avenue, New York.
- Fahien, Julius, Nos. 54 and 56 Beal street, Memphis, Tenn.
- Fairbanks, Harlan, cor. Southbridge and Myrtle streets, Worcester, Mass.
- Fairchild, Benjamin T., cor. Broadway and Twenty-fifth street, New York.
- Fale, John, care of John Fale & Co., Hawkinsville, Ga.
- Faust, Charles, Cincinnati, O.
- Featherston's, Edward R., No. 1208 Chouteau avenue, Trenton, Mo.
- Feemster, Joseph H., No. 99 Walnut street, Cincinnati, O.
- Fennel, Adolphus, cor. Eighth and Vine streets, Cincinnati, O.
- Fenner, William R., care of W. D. Hoyt & Co., Rome, Ga.
- Ferdinand, George A., 379 Main street, Dubuque, Ia.
- Ferguson, Robert B., corner Second street and Pennsylvania avenue, Washington, D. C.
- Ferree, Henry D., Springfield, Mass.
- Ferris, Charles E., Lawrenceburg, Ind.
- Field, Amos, No. 26 Vine street, Macon, Mo.
- Finger, Henry J., Santa Barbara, Cal.
- Finlay, Norman J., Glen Cove, Queen's Co., N. Y.
- Finney, Thomas J., No. 800 Boas street, Harrisburg, Pa.
- Fischer, Edward J., No. 96 North Wells street, Chicago, Ill.
- Fish, Charles F., No. 104 Broadway, Saratoga Springs, N. Y.
- Fisher, William, No. 488 Hudson street, New York.
- Flanagan, Lewis C., No. 222 North avenue, North Cambridge, Mass.
- Flemmish, Doric B., No. 139 Canal street, New Orleans, La.
- Flint, John H., Marysville, Cal.
- Foley, J. T., No. 106 Main street, Houston, Texas.
- Follansbee, Sherman, Dedham, Mass.
- Foltz, William K., No. 1465 Howard street, Akron, O.
- Ford, W. Thomas, Kansas City, Mo.
- Fougere, C. Edmund, No. 30 North William street, New York.
- Fowle, Henry D.*, No. 71 Prince street, Boston, Mass.
- Fox, Daniel S., cor. State and Madison streets, Chicago, Ill.
- Fox, Peter P., No. 2800 Spruce street, Philadelphia, Pa.
- Frames, James P., cor. Gay and Aisquith street, Baltimore, Md.
- Fraser, Edward A., New York city.
- Fredigke, Charles C., No. 472 State street, Chicago, Ill.
- French, George W., No. 860 Washington street, Boston, Mass.
- Frey, John, Bedford Hospital, New York.
- Frohwein, Richard, No. 122 First street, Elizabethport, N. J.
- Frohwein, Theobald, No. 218 Stanton street, New York.
- Frost, James, Nos. 169, 171, 173 Georgia street, Valleja, Solano County, Cal.
- Frost, John J., N. E. cor. of Main and Mill streets, Lexington, Ky.
- Frost, William A., Wilmar, Candehei Co., Minn.
- Frothingham, Edward G., Jr., Elm street, cor. Main and Water, Haverhill, Mass.

- Früh, Carl D. S., cor. Camac and Oxford streets, Philadelphia, Pa.
 Frye, George C., Portland, Me.
 Fuller, Henry W., No. 24 Market street, Chicago, Ill.
 Fuller, Oliver F., No. 24 Market street, Chicago, Ill.
 Fuller, Sumner H., Hancock street near Columbia street, Boston, Mass.
 Gaillard, Edward, No. 1802 North Eleventh street, Philadelphia, Pa.
 Gale, Edwin O., No. 85 South Clark street, Chicago, Ill.
 Gale, William H., No. 85 South Clark street, Chicago, Ill.
 Gallagher, Charles K., Second street, Washington, N. C.
 Gardiner, Warren B., No. 10 Gold street, New York.
 Gardner, Robert W., New York city.
 Garrigues, Samuel S., Derby Block, North Water street, East Saginaw, Mich.
 Garrison, Herod D., No. 511 State street, Chicago, Ill.
 Gates, Burt P., No. 888 Broadway, Saratoga, N. Y.
 Gates, Carroll E., No. 888 Broadway, Saratoga, N. Y.
 Gates, Howard E., care of Wessels & Gates, Litchfield, Conn.
 Gaus, Charles H., 202 Washington avenue, Albany, N. Y.
 Gaylord, Henry C., No. 110 Monument Square, Cleveland, O.
 Gellatly, William A., No. 170 William street, New York.
 Genois, Louis, No. 145 North Tenth street, Philadelphia, Pa.
 George, Charles T., No. 1806 North Third street, Harrisburg, Pa.
 Gerhard, Samuel, cor. Hanover and Belgrade streets, Philadelphia, Pa.
 Gessner, Emil A., New Haven, Conn.
 Gibson, William A., No. 580 King street, Charleston, S. C.
 Gill, George, P. O. Box 17, Mount Vernon, N. Y.
 Gilman, Samuel K., No. 307 Washington street, Boston, Mass.
 Gilmore, John W., Third avenue cor. One hundred and thirty-eighth street, New York.
 Girling, Robert N., P. O. Box 1810, New Orleans, La.
 Giroux, Edmond, Quebec, Canada.
 Gleeson, James A., No. 51 Harrison avenue, Boston, Mass.
 Godding, John G., cor. Berkeley and Boylston streets, Boston, Mass.
 Good, James M., cor. Twenty-second street and Clark avenue, St. Louis, Mo.
 Goodale, Harvey G., Jamaica, L. I., N. Y.
 Goodale, Thomas T., 89 Tremont street, Boston, Mass.
 Goodman, Charles F., No. 180 Farnham street, Omaha, Neb.
 Goodman, Emanuel, Cincinnati, O.
 Goodrich, Stephen, care of L. G. Moses & Co., Hartford, Conn.
 Goodwin, Lester H., cor. State and Main streets, Hartford, Conn.
 Goodwyn, John W., Petersburg, Va.
 Gordon, William J. M., No. 142 Walnut street, Cincinnati, O.
 Gordon, Edward B., No. 73 Broad street, Lynn, Mass.
 Gorham, John R. Jr., Newburgh, N. Y.
 Gosman, Adam J., cor. Charles and Mulberry streets, Baltimore, Maryland.
 Graham, William A., No. 80 Columbus avenue, Sandusky, O.
 Grahame, Israel J., cor. Twelfth and Filbert streets, Philadelphia, Pa.
 Grandjean, Charles, No. 2828 North Fourteenth street, St. Louis, Mo.
 Grandjean, Eugene, No. 2828 North Fourteenth street, St. Louis, Mo.
 Gray, Francis M., Main street, Hopkinsville, Ky.
 Gray, Henry R., No. 144 St. Lawrence street, Montreal, Quebec, Can.

- Gray, William H., Sandford street, Springfield, Mass.
- Green, Thomas T.*, Hudson River Hospital, Poughkeepsie, N. Y.
- Greene, Charles H., Atlanta, Ga.
- Greene, George E., Wyoming, R. I.
- Gregory, Edmund, Kent street, Lindsay, Ontario, Can.
- Greve, Theodore L. A., cor. John and Sixth streets, Cincinnati, O.
- Gridley, Junius*, No. 87 Maiden Lane, New York.
- Grieve, Fleming G., Milledgeville, Ga.
- Griffith, Albert R., No. 33 Centre street, Oil City, Pa.
- Griffith, Alphonzo De L., No. 33 Centre street, Oil City, Pa.
- Griffith, Hiram E., Grant's Block, Niagara Falls, N. Y.
- Griffith, William H., No. 1280 Third avenue, New York.
- Groff, John E., 39 Harrison avenue, Boston, Mass.
- Grossklaus, John F., cor. High street and Public Square, Navarre, O.
- Grove, John E., 3326 Germantown avenue, Philadelphia, Pa.
- Haag, Julius A., Denison House, Indianapolis, Ind.
- Haas, George H., No. 88 Main street, Rochester, N. Y.
- Haddox, James B., No. 42 North College street, Nashville, Tenn.
- Hadley, Frank R., No. 64 North Second street, New Bedford, Mass.
- Haenchen, Charles E., No. 3838 Haverford road, Philadelphia, Pa.
- Haight, William B., care Lockwood & Haight, Bogardus, Stamford, Conn.
- Hale, Frederick*, No. 152 William street, New York.
- Hall, Edwin B., Wellsville, Alleghany Co., N. Y.
- Hall, Marshall C., care of Hall Brothers, Fredericksburg, Va.
- Hall, Roland B., No. 90 Cherry street, Macon, Ga.
- Hallberg, Carl S. N., No. 81 Clark street, Chicago, Ill.
- Hance, Edward H., cor. Callowhill and Marshall streets, Philadelphia, Pa.
- Hancock, Charles W., No. 3425 Spring Garden street, Philadelphia, Pa.
- Hancock, John F., cor. Baltimore and Caroline streets, Baltimore, Md.
- Hancock, John Henry, New York City.
- Hankinson, Thomas, Augusta, Ga.
- Hanson, Dominicus, Central Square, Rochester, N. Y.
- Harbers, William H., Laurens street, Aiken, S. C.
- Harlow, Noah S., No. 4 Smith's Block, Bangor, Me.
- Harlow, Wickham N., No. 219 Main street, Orange, N. J.
- Harner, James M., New York city.
- Harper, Frank M., No. 45 East Main street, Madison, Ind.
- Harrington, Frank, Werland's Block, Main street, Logan, O.
- Hartness, William H., No. 109 Ontario street, Cleveland, O.
- Hartung, Hugo R., Denver, Col.
- Harvey, Edmund, Toronto, Can.
- Harwood, Frank L., Main street, Warren, Mass.
- Harwood, Lucien, Main street, Warren, Mass.
- Hassencamp, Ferdinand, No. 75 Hanover street, Baltimore, Md.
- Hatch, Frederick A., Pleasantville, Venango Co., Pa.
- Hatton, Edgar M., Zanesville, O.
- Havenstein, Alexander, Newark, N. J.
- Haviland, Henry*, No. 28 John street, New York.
- Hawkins, Joseph T., Mobile, Ala.
- Hawkins, M. Smith, No. 20 Broadway, Salem, Columbiana Co., O.
- Hay, Henry H., cor. Free and Middle streets, Portland, Me.
- Hays, David, No. 207 Division street, New York, N. Y.

- Hazlett, Edward E., S.E. cor. Norris and Mervine streets, Philadelphia, Pa.
- Hebberling, Gottfried, No. 695 Seventh street, New York.
- Heimstreet, Edward B., care of S Heimstreet & Son, Janesville, Wis.
- Heinemann, Otto, cor. Laurel and Lynn streets, Cincinnati, O.
- Heinitsh, Charles A., No. 16 East King street, Lancaster, Pa.
- Heinitsh, Edward H., Columbia, S. C.
- Heintzelman, Joseph A.*, No. 2010 Ridge avenue, Philadelphia, Pa.
- Heller, Peter H., No. 505 Pennsylvania avenue, Washington, D. C.
- Helman, Charles M., cor. Findlay and Baymiller streets, Cincinnati, O.
- Henderson, John, Toronto, Can.
- Henes, William F., No. 1620 Third avenue, New York.
- Henrich, George, cor. Mill and Jefferson streets, Mascoutah, Ill.
- Hepburn, John, No. 93 Main street, Flushing, N. Y.
- Herbruger, Florence C., Panama, U. S. of Colombia.
- Hermann, T. George, Cumberland, Md.
- Heuerman, Henry W., No. 120½ Claiborne avenue, Chicago, Ill.
- Heydenreich, Emile, No. 169 Atlantic avenue, Brooklyn, N. Y.
- Heyl, James B.*, Vice Consul, Hamilton, Bermuda.
- Higgings, Albert W., No. 41 Merchants' Row, Rutland, Vt.
- Higgins, James S., No. 24 De Lancey street, New York.
- Hildreth, Charles F., No. 54 Main street, Suncook, N. H.
- Hildreth, N. G., Cheviot, Cincinnati, Ohio.
- Hill, Alfred C., cor. Fourth and Smith streets, Cincinnati, O.
- Hilt, David, 84 Main street, Lafayette, Ind.
- Hinsdale, Samuel J., Market Square, Fayetteville, N. C.
- Hoagland, Pratt R., No. 744 Harrison avenue, Boston, Mass.
- Hodge, Charles, Nos. 75 and 76 Front street, Portland, Oregon.
- Hodgetts, George, No. 365 Yonge street, Toronto, Can.
- Hoerner, Theodore, Nos. 54 and 56 Beal street, Memphis, Tenn.
- Hoffeld, Alfred H., cor. Fourth and Market streets, New Albany, Mo.
- Hoffmann, Frederick, No. 797 Sixth avenue, New York.
- Hogan, Louis C., cor. Forty-seventh and State streets, Chicago, Ill.
- Hohenthal, Charles F. L., No. 857 Third avenue, New York.
- Hohly, Charles, No. 248 St. Clair street, Toledo, O.
- Holden, Henry, No. 62 High street, Clinton, Mass.
- Holland, Samuel P., cor. Smithfield and Liberty streets, Pittsburg, Pa.
- Holmes, Clay W., No. 319 East Water street, Elmira, N. Y.
- Holt, Alvin E., No. 333 Woodward avenue, Detroit, Mich.
- Holzhauser, Charles, No. 787 Broad street, Newark, N. J.
- Hood, Charles I., cor. Merrimac and Central streets, Lowell, Mass.
- Hooper, John H., No. 171 North Clark street, Chicago, Ill.
- Hopp, Lewis C., cor. Euclid avenue and Erie street, Cleveland, O.
- Horn, Wilbur F., No. 82 West Main street, Carlisle, Pa.
- Horton, William F., No. 15 Central street, Boston, Mass.
- Hostetter, Charles M., No. 272 Penn avenue, Pittsburg, Pa.
- Hottendorf, Augustus*, cor. Central avenue and Baymiller street, Cincinnati, O.
- Howard, Daniel D., Railroad Square, Medford, Mass.
- Howarth, James L., Atlanta, Ga.
- Howarth, John W., Genesee street, Utica, N. Y.

- Howson, Walter H., Water street, Chillicothe, O.
- Hoyt, George M., No. 61 Warren street, Boston, Mass.
- Hubbard, John H., No. 468 Harvard street, Cambridge, Mass.
- Huddart, John F., Second and Chestnut streets, Louisville, Ky.
- Hudnut, Alexander, No. 218 Broadway, New York.
- Husted, Alfred B., No. 77 Eagle street, Albany, N. Y.
- Hughes, Benjamin L., Jacksonville, Fla.
- Huling, Bruce, No. 109 Ontario street, Cleveland, O.
- Hunt, James L., cor. North and Main streets, Hingham, Mass.
- Hunt, Leonard W., Fourth street, Macon, Ga.
- Hurst, John C., No. 925 Market street, Philadelphia, Pa.
- Hurt, James F., Broadway, Columbia, Mo.
- Huston, Charles, No. 48 South High street, Columbus, O.
- Hyler, William H., Port Chester, N. Y.
- Ingalls, John, cor. Fourth and Poplar streets, Macon, Ga.
- Inloes, A. J., Binghamton, N. Y.
- Inness, George, No. 47 University Place, New York.
- Irvin, William A., Public Square, Kokoma, Ind.
- Jackson, Vincent R., cor. Gilman and Stewart streets, Baltimore, Md.
- Jacobus, Judson S., cor. Thirty-first street and Indiana avenue, Chicago, Ill.
- Jacques, George W., cor. Broadway and Augusta street, S. Amboy, N. J.
- Jagger, Charles H., Roxbury street, Boston Highlands, Mass.
- James, George R., No. 120 Grand street, Schoolcraft, Mich.
- James, Thomas P., No. 94 Brattle street, Cambridge, Mass.
- Jauncey, William, No. 112 Milwaukee avenue, Chicago, Ill.
- Jefferson, John H. B., No. 96 South Broadway, Baltimore, Md.
- Jefferson, William E., Fredericktown, Ohio.
- Jenkins, Luther L., No. 119 Leverett street, Boston, Mass.
- Jenks, Thomas L., Merrimac and Traverse streets, Boston, Mass.
- Jenks, William J., No. 160 North Third street, Philadelphia, Pa.
- Jennings, N. Hynson, No. 90 North Charles street, Baltimore, Md.
- Jesson, Jacob, Muskegon, Mich.
- Johnson, Benjamin F., No. 301 East Girard avenue, Philadelphia, Pa.
- Johnson, Charles B., Third street, Middletown, O.
- Johnson, Edward L., Tenth avenue cor. One hundred and fifty-seventh street, New York.
- Johnston, William, Nos. 153 and 155 Jefferson avenue, Detroit, Mich.
- Jones, Alexander H., Ninth and Parrish streets, Philadelphia, Pa.
- Jones, Charles K., Leffingwell and Washington avenue, St. Louis, Mo.
- Jones, Charles M., Fore street, Somersworth, N. H.
- Jones, Daniel S., Twelfth and Spruce streets, Philadelphia, Pa.
- Jones, Edward C., S. E. cor. Fifteenth and Market streets, Philadelphia, Pa.
- Jones, James T., No. 855 East Fourth street, Boston, Mass.
- Jones, Simon N., First and Jefferson streets, Louisville, Ky.
- Jones, Thomas, Nos. 1060 and 1062 Fulton street, Brooklyn, N. Y.
- Jordan, F. Francis, Court-house Square, Goderich, Can.
- Jordan, William H., No. 104 Lincoln street, Portland, Me.
- Judge, John F., near cor. Court and Cutter streets, Cincinnati, O.

- Jungmann, Julius, New York, N. Y.
 Kalb, Theodore, Second and Poplar streets, St. Louis, Mo.
 Kalish, Julius, No. 409 Grand street, New York.
 Karch, Joseph L., Ninth and Cumberland streets, Lebanon, Pa.
 Karrmann, William, Cincinnati, O.
 Kay, Isaac H., No. 1101 Arch street, Philadelphia, Pa.
 Keasby, Henry G., No. 882 North Front street, Philadelphia, Pa.
 Keeler, William H., P. O. Box 585, Saginaw City, Mich.
 Keeney, Caleb R., Sixteenth and Arch streets, Philadelphia, Pa.
 Keeshan, John, Sixth and Walnut streets, Cincinnati, O.
 Keffer, William P., Nos. 78, 75, and 77 Tchoupitoulas street, New Orleans, La.
 Kelley, Edward S., Boylston and Berkeley streets, Boston, Mass.
 Kelsey, Henry J., No. 87 Gove street, New Haven, Conn.
 Kennedy, George W., No. 108 North Centre street, Pottsville, Pa.
 Kent, Robert R., No. 7 Winthrop Block, Boston, Mass.
 Kerr, James, Sr., No. 56 Springfield street, Pittsburg, Pa.
 Kessler, Edward F., cor. Twentieth and Market streets, Louisville, Kentucky.
 Kettell, George P., No. 250 Main street, Charlestown, Mass.
 Keys, Roger, Twelfth and Pine streets, Philadelphia, Pa.
 Kidder, Samuel, Jr., No. 27 Commercial street, Lowell, Mass.
 Kielborn, Henry, Indianapolis, Ind.
Kiersted, Henry T., New York.
 Kimmel, Henry, No. 65 Avenue A, New York.
 King, James T., Main and South streets, Middletown, N. Y.
 Kirkbride, Joseph C., cor. Olive street and Jefferson avenue, St. Louis, Mo.
 Kitchen, Charles W., cor. Fulton and Washington streets, Brooklyn, N. Y.
 Klie, G. H. Charles, Bellefontaine road, Lowell, N. St. Louis, Mo.
 Kline, Mahlon N., No. 809 and 811 North Third street, Philadelphia, Pa.
 Klussmann, Hermann, cor. Fourth street and Lafayette avenue, Hoboken, N. J.
 Knabe, Gust. A., No. 484 Pennsylvania avenue, Washington, D. C.
 Knoefel, August, New Albany, Ind.
 Knowles, Henry A., No. 463 Yonge street, Toronto, Can.
 Knowlson, Alexander M., No. 350 Broadway, Troy, N. Y.
 Koch, Louis, cor. Fourth and Wood streets, Philadelphia, Pa.
 Koehnken, Herman H., cor. Third and Mill streets, Cincinnati, O.
 Krebs, Hugo, cor. Third and Market streets, St. Louis, Mo.
 Krehbiel, Gustavus, No. 243 East Houston street, New York.
 Krewson, William E., cor. Eighth and Montgomery streets, Philadelphia, Pa.
 Krieger, Philip, cor. Myrtle and Marcey streets, Brooklyn, N. Y.
 Krusemarck, Charles, cor. Twenty-second street and Indiana avenue, Chicago, Ill.
 Kuhn, Norman A., Salem, O.
 Laird, William R., No. 250 Washington street, Jersey City, N. J.
 Lambert, John A., No. 450 West Michigan street, Indianapolis, Ind.
 Land, Robert H., No. 270 Broad street, Augusta, Ga.
 Lander, John C., Yorkville, Toronto, Can.
 Lane, Alfred S., No. 18 Buffalo street, Rochester, N. Y.
 Langebecker, Charles O., Jefferson Parish, Gretna, La.
 Larwill, Joseph H., Jr., Bolivar, Tenn.

- Lattimer, Robert F., No. 74 Elm street, Westerly, R. I.
- Lauer, Michael J., No. 275 Mulberry street, Baltimore, Md.
- aurent, Eugene L., No. 27 Cedar street, Nashville, Tenn.
- Lautenbach, Robert, cor. Eutaw and Saratoga streets, Baltimore, Md.
- Lawlor, Charles J., No. 649 Bedford avenue, Brooklyn, N. Y.
- Lawton, Charles H., No. 91 Union street, New Bedford, Mass.
- Lawton, Horace A., No. 91 Union street, New Bedford, Mass.
- Laycock, Washington, No. 44 Union avenue, Rondout, N. Y.
- Lazell, Lewis, T., No. 10 Gold street, New York.
- Leary, Jeremiah T., No. 289 West Broadway, Boston, Mass.
- Lee, Addison S., No. 14 Fayetteville street, Raleigh, N. C.
- Lee, Emmor H., S. W. cor. Fourth and Linden streets, Camden, N. J.
- Lee, James A., Main street, New Iberia, La.
- Lehlbach, Paul F., No. 782 West Twenty-second street, New York.
- Lehn, Louis, No. 160 William street, New York.
- Leis, George, No. 90 Massachusetts street, Lawrence, Kas.
- Leitch, Arthur*, care of E. Shendell, St. Louis, Mo.
- Lemberger, Joseph L., No. 8 North Ninth street, Lebanon, Pa.
- Lengfeld, A. L., cor. Gary and Stockton streets, San Francisco, Cal.
- Levy, Adolph, No. 56 Doughty street, Brooklyn, N. Y.
- Lewis, Elam C., No. 2 West, cor. Merchant's row, Rutland, Vt.
- Lewis, Samuel E., No. 1404 Fourteenth street, Washington, D. C.
- Lewis, Thomas, No. 137 Myrtle avenue, Brooklyn, N. Y.
- Lillie, Charles, Main street, Great Barrington, Mass.
- Lilly, Alonzo, Jr., No. 81 Hanover street, Baltimore, Md.
- Lilly, Eli, No. 86 South Meridian street, Indianapolis, Ind.
- Lincoln, Henry W.*, No. 185 Warren street, Boston, Mass.
- Lindeman, Herman E., Box 326, Austin, Texas.
- Lindewald, Wilhelm E., Paris, France.
- Lippincott, Henry B., cor. Twentieth and Cherry streets, Philadelphia, Pa.
- Little, James, Harrisonburg, Va.
- Livingston, Borent V. B., No. 306 Broadway, Brooklyn, N. Y.
- Llewellyn, John F., west side Public street, Mexico, Adrian County, Mo.
- Lloyd, John U., cor. Court and Plum streets, Cincinnati, O.
- Lobstein, J. F. Daniel, Main street, Sag Harbor, N. Y.
- Lohman, George H., No. 1 Mitchell's Block, Kendallville, Ind.
- Loomis, John C., cor. Chestnut and Wall streets, Jeffersonville, Ind.
- Lowd, John C., No. 43 Temple Place, Boston, Mass.
- Lowden, John, No. 18 De Breseles street, Montreal, Can.
- Luce, Edgar H., 61 Warren street, Boston, Mass.
- Luckenback, Edward H., No. 8 Broad street, Bethlehem, Pa.
- Ludlow, Charles, No. 55 East Main street, Springfield, O.
- Luhn, Gustavus J., P. O. Box 582, Charleston, S. C.
- Lumsden, Charles H., No. 55 East Main street, Lynchburg, Va.
- Lyman, C. M., Buffalo, N. Y.
- Lyman, Stephen J., No. 582 South Paul street, Montreal, Quebec, Can.
- Lyons, Isaac L., Nos. 42 and 44 Camp street, New Orleans, La.
- McAfee, James A., S. E. cor. Eighth and Jefferson streets, Louisville, Ky.

- McCarty, William, North Park Place, Morristown, N. J.
- McConville, Thomas A., No. 24 Trumbull street, Worcester, Mass.
- McElhenie, Thomas D., No. 259 Ryerson street, Brooklyn, N. Y.
- McInall, Edward, Jr., cor. Second and Market streets, Wilmington, Del.
- McIntyre, Byron F., No. 10 Gold street, New York.
- McIntyre, Ewen, No. 874 Broadway, New York.
- McIntyre, William, No. 2229 Frankford avenue, Philadelphia, Pa.
- McKay, George J., Second street, Eureka, Humboldt Bay, Cal.
- McKelway, George J., No. 1410 Chestnut street, Philadelphia, Pa.
- McKenney, Jesse F., Shelbyville, Ky.
- McKesson, John, Jr., No. 91 Fulton street, New York.
- McPherson, George, Chicago, Ill.
- Macdonald, George, No. 106 Main street, Kalamazoo, Mich.
- Mace, F. Borden, Front street, Beaufort, N. C.
- Macmahon, Thomas J., No. 188 Sixth avenue, New York.
- Magill, Benjamin M., cor. Seventeenth and Columbia avenue, Philadelphia, Pa.
- Mahla, Frederick, cor. Twenty-first street and Howard avenue, Chicago, Ill.
- Main, Thomas F., P. O. Box 1808, New York.
- MAISCH, JOHN M., No. 145 North Tenth street, Philadelphia, Pa.
- Major, John R., No. 800 Seventh street, Washington, D. C.
- Mallinckrodt, Edward, cor. Mallinckrodt and Main streets, St. Louis, Mo.
- Mangold, Gustavus A., No. 4 East State street, Trenton, N. J.
- Markoe, George F. H., cor. Warren and Dudley streets, Boston, Mass.
- Marsh, Edward H., No. 10 Gold street, New York.
- Marshall, Ernest C., No. 51 Vine street, Charlestown, Mass.
- Marshall, Hubert J., Aurora, Ind.
- Martin, Emil, Russell avenue and South Meridian street, Indianapolis, Ind.
- Marvel, Amos F., Taunton, Mass.
- Marvin, Thomas E. O., Nos. 36 and 38 Bow street, Portsmouth, N. H.
- Masi, Frederick H., Main and Granby streets, Norfolk, Va.
- Mason, Norman N., No. 129 North Main street, Providence, R. I.
- Massey, George, care of Lauman & Kemp, New York.
- Mattern, William K., No. 2540 Germantown avenue, Philadelphia, Pa.
- Mattison, Richard V., No. 882 North Front street, Philadelphia, Pa.
- May, James O., Naugatuck, Conn.
- Mayell, Alfred, cor. Euclid avenue and Erie street, Cleveland, O.
- Meade, Richard H., No. 99 East Main street, Richmond, Va.
- Melchers, Henry, cor. Genesee and Jefferson streets, East Saginaw, Mich.
- Mellor, Alfred, No. 218 North Twenty-second street, Philadelphia, Pa.
- Melvin, James S., No. 48 Temple Place, Boston, Mass.
- Menard, Alexander A., Fourth street, Macon, Ga.
- Menninger, Henry J., No. 25 Sands street, Brooklyn, N. Y.
- Mercein, James R., No. 41 Montgomery avenue, Jersey City, N. J.
- Merrell, George, Cincinnati, O.
- Merrell, William S., No. 5 West Fifth street, Cincinnati, O.
- Merrill, Charles A., No. 52 Water street, Exeter, N. H.
- Merrill, Walter S., Maple street, Danvers, Mass.
- Metcalf, Theodore, No. 29 Tremont street, Boston, Mass.

- Metzner, Adolph, No. 94 East Washington street, Indianapolis, Ind.
- Meyer, Christian F. G., No. 8 North Second street, St. Louis, Mo.
- Meyers, Edward T., No. 16 Main street, Bethlehem, Pa.
- Meyers, James A., Odd Fellows' Hall, Columbia, Pa.
- Michaelis, Charles O., cor. King and Cannon streets, Charleston, S. C.
- Milburn, John A., No. 1429 Pennsylvania avenue, Washington, D. C.
- Milhau, Edward L., No. 183 Broadway, New York.
- Mill, James W., cor. Ogden and West Madison streets, Chicago, Ill.
- Milleman, Philip, cor. Milwaukee avenue and Division street, Chicago, Ill.
- Miller, Adolphus W., cor. Third and Callowhill streets, Philadelphia, Pa.
- Miller, Charles M., Mansfield, O.
- Miller, Frederick C., cor. Clay and Market streets, Louisville, Ky.
- Miller, George Y., No. 2 River street, Luzerne, Warren Co., N. Y.
- Miller, Jacob A., cor. Second and Chestnut streets, Harrisburg, Pa.
- Miller, Jason A., Gloversville, Fulton Co., N. Y.
- Miller, Louis, No. 49 High street, Mount Holly, N. J.
- Miller, Polk, No. 900 East Main street, Richmond, Va.
- Milligan, Decatur, No. 509 North Second street, Philadelphia, Pa.
- Milliner, Willam T., Union street, Spencerport, N. Y.
- Mingay, James, No. 472 Broadway, Saratoga Springs, N. Y.
- Mitchell, Charles L., cor. Ninth and Race streets, Philadelphia, Pa.
- Mitnacht, Henry, cor. Pennsylvania avenue and Townsend street, Baltimore, Md.
- Miville, Francis C., No. 1028 Elm street, Manchester, N. H.
- Moffit, Thomas S., 822 Clay street, San Francisco, Cal.
- Mohr, Charles, No. 177 Dauphin street, Mobile, Ala.
- Moise, Benjamin F., No. 180 Meeting street, Charleston, S. C.
- Moith, *Augustus T.*, No. 1 Ferry street, Fishkill, N. Y.
- Moll, William, Saginaw City, Mich.
- Molwitz, Ernest, No. 948 Sixth avenue, New York.
- Monsarrat, Oscar, No. 113 South Broadway, Baltimore, Md.
- Moody, Richard H., cor. Main and High streets, Belfast, Me.
- Moore, George, No. 26 Market street, Somersworth, N. H.
- Moore, *J. Faris*, Howard and Madison streets, Baltimore, Md.
- Moore, James P., No. 261 Superior street, Cleveland, O.
- Moore, Joachim B., Thirteenth and Lombard streets, Philadelphia, Pa.
- Moore, Thomas F., Mobile, Ala.
- Moorhead, William W., No. 818 Arch street, Philadelphia, Pa.
- Morgan, Benjamin G., Main and Jackson streets, Hyde Park, Pa.
- Morgan, *James*, Ypsilanti, Mich.
- Morgan, Richard E., No. 185 High street, Holyoke, Mass.
- Morgan, Young H., Cochran, Ga.
- Morley, William J., No. 208 East Pecan street, Austin, Texas.
- Morrill, Benjamin, care of Curtis, Gates & Co., Littleton, N. H.
- Morrison, Samuel C., Main street, Stamford, Conn.
- Morrison, S. Ellwood, No. 25 Sharp street, Baltimore, Md.
- Morrison, Thomas O., No. 166 Eighth avenue, New York.
- Mortimer, William G., New York.
- Mott, Henry A., Jr., No. 117 Wall street, New York.
- Mueller, Adolphus, Cherry street, Highland, Ill.
- Mueller, Louis H., Indianapolis, Ind.
- Munds, James C., Third street, Wilmington, N. C.

- Munson, Luzerne J., Apothecaries' Hall, Waterbury, Conn.
- Murray, Francis M., Philadelphia, Pa.
- Muth, John P., Nos. 14 and 16 German street, Baltimore, Md.
- Napier, Henry B., Oswego, N. Y.
- Needles, Caleb H., cor. Twelfth and Race streets, Philadelphia, Pa.
- Neegaard, William, No. 1188 Broadway, New York.
- Newbold, Thomas M., 4160 Chestnut street, Philadelphia, Pa.
- Newman, George A., cor. Fifth and Walnut streets, Louisville, Ky.
- Newman, George A., No. 880 Myrtle avenue, Brooklyn, N. Y.
- Nesbitt, Charles A., cor. Seventeenth and Franklin streets, Richmond, Va.
- Nichols, Edward P., No. 901 Broad street, Newark, N. J.
- Nichols, Thomas B., No. 159½ Essex street, Salem, Mass.
- Nick, William F., Jr., No. 1390 Peach street, Erie, Pa.
- Nicot, Lewis E., No. 54 Union street, Brooklyn, N. Y.
- Niebrugge, John A., No. 506 Bedford avenue, Brooklyn, N. Y.
- Nienstaedt, Hermann, No. 1804 Couter avenue, Dubuque, Ia.
- Nietsch, Adolph J. W., Harrison avenue and Walnut street, Brooklyn, N. Y.
- Nipgen, John A., Chillicothe, Ohio.
- Noble, John J., Centre and Pelham streets, Newton Centre, Mass.
- Nodler, Peter, Covington, Ky.
- Nolting, Adolphus W., Jr., No. 1722 East Main street, Richmond, Va.
- Noyes, Parker J., Lancaster, N. H.
- Outman, Le Roy S., Angola, Erie County, N. Y.
- O'Brien, James J., No. 53 Kneeland street, Boston, Mass.
- O'Donnel, James D., No. 751 Eighth street, Washington, D. C.
- O'Gallagher, James, No. 2825 Broadway, St. Louis, Mo.
- O'Neil, Henry M., No. 463 Hudson street, New York, N. Y.
- Ohliger, Lewis P., No. 23 West Liberty street, Wooster, O.
- Oldberg, Oscar, Treasury Department, Washington, D. C.
- Oleson, Olaf M., Market street, Fort Dodge, Ia.
- Oliver, William M., No. 132 Broad street, Elizabeth, N. J.
- Ollif, James H., No. 855 Fulton street, Brooklyn, N. Y.
- Orne, Charles P., No. 498 Main street, Cambridgeport, Mass.
- Orne, Joel S., No. 493 Main street, Cambridgeport, Mass.
- Osburn, William H., cor. Greene and Baltimore streets, Baltimore, Md.
- Osgood, Hugh H., No. 148 Main street, Norwich, Conn.
- Osmun, Charles A., No. 18 Seventh avenue, New York.
- Ottinger, James J., No. 1412 Walnut street, Philadelphia, Pa.
- Owens, Richard J., cor. Myrtle and Spencer streets, Brooklyn, N. Y.
- Oxley, Jefferson, Nicholasville, Ky.
- Paine, James D., No. 18 Buffalo street, Rochester, N. Y.
- Paine, Milton K., cor. Main and State streets, Windsor, Vt.
- Painter, Emlen, cor. Clay and Kearney streets, San Francisco, Cal.
- Palmer, John D., Monticello, Fla.
- Panknin, Charles F., No. 123 Meeting street, Charleston, S. C.
- Parcher, George A., Main street, Ellsworth, Me.
- Parker, George H., Drapers' Block, Main street, Andover, Mass.
- Parr, John C., Main street, Weston, Mo.
- Parrish, Clemmons, No. 512 Parrish street, Philadelphia, Pa.
- Parrish, Dillwyn, No. 1017 Cherry street, Philadelphia, Pa.
- Parsons, John, No. 684 Wabash avenue, Chicago, Ill.

- Parsons, Robert E., No. 19 Main street, Orange, N. J.
- Partridge, Charles K., Granite Block, Augusta, Me.
- Patch, Edgar L., No. 90 Green street, Boston, Mass.
- Patten, I. Bartlett*, No. 89 Harrison street, Boston, Mass.
- Patten, John F., No. 1 Granite Block, East Market street, Bangor, Me.
- Patten, William A., Catlettsburg, Ky.
- Patterson, James L., cor. Twenty-first street and Ridge avenue, Philadelphia, Pa.
- Pauley, F. G., cor. Easton and Compton avenues, St. Louis, Mo.
- Pauly, Christian, cor. Pacific avenue and Myrtle street, Jersey City, N. J.
- Peabody, William H.*, No. 8 South Division street, Buffalo, N. Y.
- Peacock, Frederick S., No. 102 Whitehall street, Atlanta, Ga.
- Peirpoint, Newton, Englewood, Cook County, Ill.
- Peixotto, Moses L. M., No. 686 Sixth avenue, New York.
- Pennington, T. H. Sands, No. 400 Broadway, Saratoga, N. Y.
- Penrose, Stephen F., Quakertown, Pa.
- Perkins, Benjamin A., Portland, Me.
- Perkins, Elisha H.*, cor. Green and Baltimore streets, Baltimore, Md.
- Perkins, William A., No. 213 Main street, Virginia City, Nev.
- Perot, T. Morris*, No. 1810 Pine street, Philadelphia, Pa.
- Perry, Bayard T., No. 1088 Elm street, Manchester, N. H.
- Perry, Frank V., No. 213 Main street, Danbury, Conn.
- Perry, Joseph R., Indianapolis, Ind.
- Peters, Alexander C., No. 252 Orange street, Newark, N. J.
- Petrie, Alexander B., Corbett's Block, Wyndham street, Guelph, Ont., Can.
- Pfingst, Edward C., cor. Third and Breckenridge streets, Louisville, Ky.
- Pfingst, Ferdinand J., cor. Twentieth and Market streets, Louisville, Ky.
- Pfingst, Henry A., cor. Eleventh and Market streets, Louisville, Ky.
- Pfingsten, Gustavus, No. 900 Second avenue, New York.
- Phelps, Dwight, opposite Methodist Church, West Winstead, Conn.
- Phillips, Walter F.*, Nos. 184, 186, and 188 Middle street, Portland, Me.
- Phipps, John M., Day's Block, Main street, Monson, Mass.
- Physick, Henry S., No. 810 Olive street, St. Louis, Mo.
- Pierce, Frank W., Chester, Vt.
- Pierce, William H., 2147 Washington street, Boston, Mass.
- Pile, Wilson H., cor. Passyunk avenue and Catharine street, Philadelphia, Pa.
- Pinkham, Alonzo T., Franklin Square, Dover, N. H.
- Pinson, John L., Atlanta, Ga.
- Pitt, John R., Jr., No. 218 Main street, Middletown, Conn.
- Plaisted, James H., Main street, Waterville, Me.
- Plumer, William L., St. Louis, Mo.
- Plummer, David G., No. 6 Main street, Bradford, Stark Co., Ill.
- Plummer, George B., Water street, Hinsdale, Mass.
- Post, Elisha, cor. Main and Pine streets, Athens, N. Y.
- Power, Frederick B., Fischer Staden 2, Strassburg, Germany.
- Powell, Thomas W., No. 10 Houston street, Fort Worth, Texas.
- Prall, Delbert E., No. 785 Wabash avenue, Chicago, Ill.
- Prentice, Fred. F., opposite Post-office, Janesville, Wis.
- Prescott, Albert B., University of Michigan, Ann Arbor, Mich.

- Prescott, Horace A., Dorchester, Mass.
 Preston, David, cor. Ninth and Lombard streets, Philadelphia, Pa.
 Procter, Wallace, cor. Ninth and Lombard streets, Philadelphia, Pa.
 Proctor, Benjamin, No. 6 Healey's Arcade, Lynn, Mass.
 Pugh, Finley B., Main street, Rushville, Ind.
 Punch, William F., Mobile, Ala.
 Purcell, John B., No 1216 East Main street, Richmond, Va.
 Pyle, Cyrus, No. 326 Fulton street, Brooklyn, N. Y.
 Raas, Francis, Union and Hoyt streets, Brooklyn, N. Y.
 Rackley, Benjamin F., Franklin Square and Charles street, Dover, N. H.
 Rademaker, H. H., Louisville, Ky.
 Ramsperger, Gustavus, No. 708 Fulton street, Brooklyn, N. Y.
 Randall, George D., Railroad street, St. Johnsbury, Vt.
 Rankin, Charles F., No. 128 Meeting street, Charleston, S. C.
 Rankin, Jesse W., Decatur and Pryor streets, Atlanta, Ga.
 Rano, Charles O., No 1872 Niagara street, Buffalo, N. Y.
 Rapelye, Charles A., No. 605 Main street, Hartford, Conn.
 Raser, John B., No. 164 North Eighth street, Reading, Pa.
 Reichardt, F. Alfred, No. 404 Fourth avenue, New York.
 Reichenbach, Fred. F., St. Louis, Mo.
 Reinhold, William, No. 146 North Clark street, Chicago, Ill.
 Reinlein, Paul, Washington, D. C.
 Remington, Joseph P., cor. Thirteenth and Walnut streets, Philadelphia, Pa.
 Rendings, Charles P., cor. Spring and Abigail streets, Cincinnati, Ohio.
 Renouff, James T., Main street, Winstead, Conn.
 Restieaux, Thomas, No. 29 Tremont street, Boston, Mass.
 Reum, Hermann F., cor. Fifth and Broadway, Cincinnati, Ohio.
 Reynolds, Howard P., Cor. Front and Cherry streets, Plainfield, N. J.
 Reynolds, John J., No. 2 Marietta street, Atlanta, Ga.
 Reynolds, William K., No. 354 Friendship street, Providence, R. I.
 Rhoades, Stephen H., No. 88 Main street, Pittston, Pa.
 Rice, Charles, Bellevue Hospital, New York.
 Rico, J. Allen, No. 116 Main street, Milford, Mass.
 Richardson, J. Clifford, No. 704 North Main street, St. Louis, Mo.
 Richardson, James H., No. 52 Lake street, Chicago, Ill.
 Richardson, Marius D., cor. Mill and Short streets, Lexington, Ky.
 Ricker, George D., No. 178 Salem street, Boston, Mass.
 Ricksecker, Theodore, No. 146 William street, New York.
 Rickey, Randal, No. 157 North Green street, Trenton, N. J.
 Riddell, James A., Aurora, Ind.
 Rideout, James W., No. 171 Smith street, Brooklyn, N. Y.
 Rieffenstahl, Julius, Buffalo, N. Y.
 Riley, Charles W., No. 1115 Race street, Philadelphia, Pa.
 Rittenhouse, Henry N., No. 218 North Twenty-second street, Philadelphia, Pa.
 Robbins, Alonzo, cor. Eleventh and Vine streets, Philadelphia, Pa.
 Robbins, Charles A., No. 91 Fulton street, New York.
 Robbins, Daniel C., No. 91 Fulton street, New York.
 Roberts, Joseph, cor. Harford and Greenmount avenue, Baltimore, Md.
 Robinson, James S., cor. second and Madison streets, Memphis, Tenn.

- Robinson, William S., Yorkville, Toronto, Can.
- Roche, Edward M., No. 611 South Fifteenth street, Philadelphia, Pa.
- Roche, William F., cor. Twentieth and South streets, Philadelphia, Pa.
- Rogers, Wiley, cor. Fifteenth and Chestnut streets, Louisville, Ky.
- Rogers, William H., North street, Middletown, N. Y.
- Rohrbach, Theodore, Fort George, Florida.
- Rollins, John F.*, Fort George, Florida
- Ronnefeld, Theodore, No. 195 Gratiot street, Detroit, Mich.
- Rose, Henry J., cor. Yonge and Queen streets, Toronto, Ont., Can.
- Rosengarten, Mitchell G., cor. Seventeenth and Fitzwater streets, Philadelphia, Pa.
- Ross, George, opposite Court-house, Lebanon, Pa.
- Royce, Lucien M., No. 91 Fulton street, New York
- Rozezlawski, Augustus, cor. Gates and Classon avenues, Brooklyn, N. Y.
- Ruete, Theodore W., No. 379 Main street, Dubuque, Iowa.
- Rumsey, Samuel L., cor. Main street and Arlington avenue, East Orange, N. J.
- Runyon, Edward W., care of Hostetter & Smith, San Francisco, Cal.
- Russell, E. Walter, cor. Baltimore and Eutaw streets, Baltimore, Md.
- Russell, Elias S., No. 69 Main street, Nashua, N. H.
- Russell, Eugene J.*, cor. Army street and Canton avenue, Baltimore, Md.
- Rust, William, No. 7 Peace street, New Brunswick, N. J.
- Sackett, Samuel M., No. 29 Front street, Monroe, Mich.
- Safford, William B., cor. Vance and Hernando streets, Memphis, Tenn.
- Sander, Enno, cor. Nineteenth and S. Eleventh streets, St. Louis, Mo.
- Sands, George G., No. 755 Sixth avenue, New York.
- Sappington, Richard, No. 181 North Gay street, Baltimore, Md.
- Sargent, Ezekiel H., No. 125 State street, Chicago, Ill.
- Saunders, Richard B.*, Chapel Hill, N. C.
- Saunders, William, London, Ontario, Can.
- Sautter, Louis, cor. South Pearl and Plain streets, Albany, N. Y.
- Sayre, Edward A., No. 461 Myrtle avenue, Brooklyn, N. Y.
- Sayre, William H., cor. Warner and Orange streets, Newark, N. J.
- Scala, William Franklin, Washington, D. C.
- Scattergood, George J., No. 418 Spruce street, Philadelphia.
- Schaaf, Justice H., P. O. Lock Box 44, Vidalia, La.
- Schaefer, George H., No. 129 Front street, Fort Madison, Iowa.
- Schaffle, Samuel W. W., Market street, Lewisburg, Pa.
- Schafhirt, Adolph J., cor. First and H streets, Washington, D. C.
- Scheffer, Emil, No. 145 Market street, Louisville, Ky.
- Scheffer, Henry W., No. 209 Myrtle street, St. Louis, Mo.
- Scherff, John P., Glenwood avenue and Washington street, Bloomfield, N. J.
- Schley, Steiner, Frederick City, Md.
- Schloepfer, Henry J., Evansville, Ind.
- Scholz, Philip, No. 3627 Broadway, St. Louis, Mo.
- Schrader, Henry, No. 74 East Washington street, Indianapolis, Ind.
- Schranck Henry C., Nos. 437 and 439 East Water street, Milwaukee, Wis.
- Schreiber, August, Odd Fellows' Hall, Eighth street, Tell City, Ind.
- Schroder, Hermann, No. 525 Main street, Quincy, Ill.

- Schumann, P. J., Whitehall and Hunter streets, Atlanta, Ga.
 Schumann, Theodore, cor. Whitehall and Hunter streets, Atlanta, Ga.
 Scofield, James S., No. 122 Bleecker street, New York.
 Scott, Albert A., No. 2422 Broad street, Richmond, Va.
Scott, Nelson R., cor. Main and Southridge streets, Worcester, Mass
 Scott, William H., No. 1617 Seventeenth street, Richmond, Va.
 Scott, William J., No. 257 Prospect street, Cleveland, O.
 Scribner, Benjamin F., cor. Main and State streets, New Albany, Ind.
 Seabury, George J., No. 30 Platt street, New York.
 Seward, Daniel W., No. 1280 Third avenue, New York.
 Sechler, James C., No. 201 Mill street, Danville, Pa.
 Sulfridge, Matthew M., No. 709 Marshall street, Philadelphia, Pa.
 Senior, Frederick S., No. 1122 Humboldt avenue, Milwaukee, Wis.
 Sennewald, Ferdinand W., No. 800 Hickory street, St. Louis, Mo.
 Sevin, N. Douglass, No. 141 Main street, Norwich, Conn.
 Sewall, David J., Dorchester avenue and Adams street, Boston, Mass.
 Sharp, Alpheus P., cor. Pratt and Howard streets, Baltimore, Md.
 Sharp, J. Perin, Wabash avenue and Twenty-second street, Chicago, Ill.
 Sharpless, Stephen P., No. 114 State street, Boston, Mass.
 Shaw, Lewis, cor. Fifteenth and Market streets, Philadelphia, Pa.
 Shaw, Robert J., Plainfield, N. J.
 Shaw, Stephen F., Worcester, Mass.
 Shead, Edward E., No. 8 Water street, Eastport, Me.
 Shedd, Edwin W., No. 61 Warren street, Boston, Mass.
 Shedden, John W., No. 1275 Broadway, New York.
 Sheila, George E., No. 896 Broadway, New York.
 Sheppard, Samuel A. D., No. 1129 Washington street, Boston, Massachusetts.
 Sherman, Linus E., Ludlow, Vt.
 Sherwood, Hozekiah S., No. 839 Main street, Poughkeepsie, N. Y.
 Shinn, James T., cor. Broad and Spruce streets, Philadelphia, Pa.
 Shivers, Charles, cor. Seventh and Spruce streets, Philadelphia, Pa.
 Shoemaker, Joseph L., cor. Sixth and Girard avenue, Philadelphia, Pa.
 Shoemaker, Richard M., cor. Fourth and Race streets, Philadelphia, Pa.
 Shriver, Henry, No. 53 Baltimore street, Cumberland, Md.
 Shryer, Thomas W., No. 108 Baltimore street, Cumberland, Md.
 Shryock, Allen, cor. Broad and Parrish streets, Philadelphia, Pa.
 Shurtleff, Israel H., No. 39 Elm street, New Bedford, Mass.
 Shuttleworth, Edward B., No. 280 Sherburne street, Toronto, Ontario, Can.
 Simms, Giles G. C., No. 1344 New York avenue, Washington, D. C.
 Simpson, William, No. 88 Fayetteville street, Raleigh, N. C.
 Simpson, William, San Francisco, Cal.
 Simson, Francis C., Halifax, N. S.
 Simpser, J. Wilmer, cor. Thirteenth street and Columbia avenue, Philadelphia, Pa.
 Singer, Peter J., Nos. 218, 220, and 222 Water street, Peoria, Ill.
 Sitton, Charles E., No. 151 First street, Portland, Oregon.
 Skelly, James T., No. 339 East Fourth street, New York.
 Sliter, Albert H., cor. Fifth and Congress streets, Troy, N. Y.
 Sloan, George W., Nos. 7 and 9 East Washington street, Indianapolis, Ind.

- Smalley, Elijah, No. 271 Harrison avenue, Boston, Mass.
- Smith, Charles B., No. 861 Broad street, Newark, N. J.
- Smith, Charles G., No. 39 West Main street, Springfield, O.
- Smith, Israel P., No. 324 Bank street, Newark, N. J.
- Smith, Joseph S., Akron, O.
- Smith, Linton, cor. Seventh and Market streets, Wilmington, Del.
- Smith, Samuel H., Winston, N. C.
- Smith, Thomas C., Charlotte, N. C.
- Snow, Charles W., No. 28 East Genesee street, Syracuse, N. Y.
- Snow, Jesse W., No. 23 Charles street, Boston, Mass.
- Snowdon, George M., cor. Fourth and Noble streets, Philadelphia, Pa.
- Snyder, Alva L., No. 38 Court Square, Bryan, Ohio.
- Snyder, Ambrose C., cor. Court and Atlantic avenue, Brooklyn, N. Y.
- Somers, Frank G., No. 125 State street, Chicago, Ill.
- Sommers, Richard M., No. 514 Birkley street, Camden, N. J.
- Spalding, Warren A., No. 19 Church street, New Haven, Conn.
- Spannagel, Charles C., No. 1607 Ridge avenue, Philadelphia, Pa.
- Spencer, Peter I., No. 88 Garden street, Cleveland, O.
- Squibb, Edward R., No. 56 Doughty street, Brooklyn, N. Y.
- Squires, C. P., Nos. 112, 114, and 116 Jefferson street, Burlington, Iowa.
- Stacy, Benjamin F., No. 51 Vine street, Charlestown, Mass.
- Stackpole, Harry H., No. 105 Cambridge street, East Cambridge, Mass.
- Stamford, William H., No. 256 Mulberry street, Newark, N. J.
- Stanford, James W., Cuthbert, Ga.
- Stanley, Frederick P., Atlanta, Ga.
- Starr, Thomas, cor. Ninth avenue and Twenty-eighth street, New York.
- Steele, Henry*, San Francisco, Cal.
- Steele, James G., No. 316 Kearney street, San Francisco, Cal.
- Stein, Jacob H., No. 808 Penn street, Reading, Pa.
- Stevens, Luther F., Jamaica, L.I., N. Y.
- Stout, William A., No. 80 North Market street, Springfield, O.
- Stowell, Daniel, No. 1045 Washington street, Boston, Mass.
- Strassel, William, cor. Shelby and Broadway, Louisville, Ky.
- Strehl, Louis C., Chicago, Ill.
- Strother, William A., No. 126 Main street, Lynchburg, Va.
- Sutton, Peter P., cor. Floyd and Market streets, Louisville, Ky.
- Sweeney, Robert O., West Third street, St. Paul, Minn.
- Sweet, Henry, cor. Kinsie and Desplaines streets, Chicago, Ill.
- Taliaferro, E. C., cor. Fourth and Franklin streets, Richmond, Va.
- Tarrant, Homer P., No. 212 Broad street, Augusta, Ga.
- Tartis, Alfred J., No. 62 Broadway, Brooklyn, N. Y.
- Taylor, Alfred B., 81 South Eleventh street, Philadelphia, Pa.
- Taylor, Henry B., No. 1806 Girard avenue, Philadelphia, Pa.
- Taylor, James H., No. 104 Thames street, Newport, R. I.
- Taylor, John P., No. 99 Third street, New Bedford, Mass.
- Taylor, Walter A., No. 9 Peachtree street, Atlanta, Ga.
- Test, Alfred W., cor. Second and Federal streets, Camden, N. J.
- Thatcher, Joseph H., No. 12 Market street, Portsmouth, N. H.
- Thatcher, Hervey D., No. 12 Market Square, Potsdam, N. Y.
- Thayer, Henry, No. 150 Broadway, Cambridgeport, Mass.
- Thibodeaux, Joseph G., Main street, Thibodeaux, La.

- Thomas, James Jr., opposite Maxwell House, Nashville, Tenn.
- Thompson, Thomas C., care of G. R. Finlay & Co., New Orleans, La.
- Thompson, William B., No. 1700 Mount Vernon street, Philadelphia, Pa.
- Thompson, William P., No. 5 West Baltimore street, Baltimore, Md.
- Thompson, William S., No. 705 Fifteenth street, Washington, D. C.
- Thompson, William S., No. 5 West Baltimore street, Baltimore, Md.
- Thomsen, John J., Nos. 14 and 16 German street, Baltimore, Md.
- Thorn, Henry P., Medford, N. J.
- Thorp, Abner, Cincinnati, Ohio.
- Tibbs, William H., No. 235 Main street, Buffalo, N. Y.
- Tilden, Henry A., New Lebanon, N. Y.
- Tilyard, Charles S., cor. Green and Franklin streets, Baltimore, Md.
- Timberlake, Arthur, Indianapolis, Ind.
- Tobey, Charles W., Troy, Ohio.
- Tomfohrde, John W., St. Louis, Mo.
- Tompkins, Orlando, Boston Theatre, Boston, Mass.
- Tooker, William W., Sag Harbor, N. Y.
- Topley, James, Vallejo, Solano County, Cal.
- Toplis, Robert J., Getty Square, Yonkers, N. Y.
- Tower, Levi, Jr., No. 1681 Washington street, Boston, Mass.
- Townley, William W., No. 765 Broad street, Newark, N. J.
- Tozzer, Samuel C., No. 95 Broad street, Lynn, Mass.
- Trask, Charles M., No. 21 Pleasant street, Boston, Mass.
- Trimble, Henry, cor. Fifth and Callowbill streets, Philadelphia, Pa.
- Troth, Samuel F., No. 1019 Cherry street, Philadelphia, Pa.
- Tscheppe, Adolph, No. 1010 Third avenue, New York, N. Y.
- Turner, Thomas L., No. 390 Tremont street, Boston, Mass.
- Turnley, Pryor L., 8 Choice Hotel, Rome, Geo.
- Tufts, Charles A., No. 25 Washington street, Dover, N. H.
- Tyson, Samuel E., No. 141 West street, Georgetown, D. C.
- Ubert, Julius C., cor. Lee and Division streets, Brooklyn, N. Y.
- Ude, George, No. 3610 North Tenth street, St. Louis, Mo.
- Underhill, George F., cor. Main and School streets, Concord, N. H.
- Underhill, Joseph G., No. 397 Classon avenue, Brooklyn, N. Y.
- Underhill, William H., Haverhill, Mass.
- Underwood, Charles G., cor. Lewis street and Maverick Square, Boston, Mass.
- Vandegrift, John A., No. 69 High street, Burlington, N. J.
- Vander Emde, Reinhold, 823 Bowery, New York.
- Vandervoord, Ransford, W., No. 482 Broad street, Newark, N. J.
- Van Gieson, Theron W., No. 397 Broad street, Newark, N. J.
- Van Patten, William J., College street, Burlington, Vt.
- Vansant, Robert H., Astoria, L. I., N. Y.
- Van Winkle, Abraham W., No. 85 Clinton avenue, Newark, N. J.
- Vaupel, Charles P., No. 261 Superior street, Cleveland, Ohio.
- Venable, R. H., Bardstown, Ky.
- Vernor James, No. 235 Woodward avenue, Detroit, Mich.
- Viallon, Paul L., Bayou Goula, Louisiana.
- Vickery, William H., S. W. cor. Central and Orchard streets, Dover, N. H.

- Vincent, William, No. 117 Broadway, Brooklyn, N. Y.
- Voelcker, Rudolph, Galveston, Texas.
- Vogelbach, Herman A., Philadelphia, Pa.
- Vogeler, Adolph G., No. 56 West Randolph street, Chicago, Ill.
- Voorhees, William H., No. 21 Front street, Plainfield, N. J.
- Vordick, August H., S. E. cor. Jefferson avenue and Benton street, St. Louis, Mo.
- Wagener, Samuel H., No. 809 First street, San Jose, Cal.
- Wagner, Henry, cor. Fourth and Elm streets, Cincinnati, O.
- Wakefield, Seth D., No. 72 Lisbon street, Lewiston, Me.
- Walch, Robert H., No. 1412 Walnut street, Philadelphia, Pa.
- Walker, F. W., Jr., New Brighton, Pa.
- Wallace, A. C., Main street, Bellefontaine, Ohio.
- Wallace, Austin E., No. 1 Goodrich Block, Nashua, N. H.
- Wanier, George S., No. 407 Eighth avenue, New York.
- Wardell, Robert C., Battle Creek, Mich.*
- Warner, William R., No. 1228 Market street, Philadelphia, Pa.*
- Warrington, Chas. W., cor. Fifth and Callowhill streets, Philadelphia, Pa.
- Waugh, George J., Stratford, Ontario, Can.
- Wayne, Edward S., No. 146 Broadway, Cincinnati, O.
- Weaver, J. Thornton, No. 1341 Ridge avenue, Philadelphia, Pa.
- Weaver, James, No. 1275 Broadway, New York.
- Weaver, John A., No. 210 Madison avenue, Easton, Pa.
- Webb, John A., No. 210 Madison avenue, Baltimore, Md.
- Webb, M. H., Simpsonville, Ky.
- Webb, William H., No. 633 North Sixteenth street, Philadelphia, Pa.
- Webber, Joseph T., cor. Main and State streets, Springfield, Mass.
- Weber, William, cor. Fifteenth and Thompson streets, Philadelphia, Pa.
- Webster, Stephen, No. 63 Warren avenue, Boston, Mass.
- Weidemann, Charles A., No. 568 North Twenty-second street, Philadelphia, Pa.
- Weinman, Oscar C., No. 173 Seventh avenue, N. Y.
- Weismann, Augustus W., No. 257 Broom street, New York.
- Welch, Leonard E., Albany, Ga.
- Wellcome, Henry S., No. 91 Fulton street, New York.
- Wells, Charles W., No. 70 First street, Lowell, Mass.
- Wells, Ebenezer M., Houston street, Fort Worth, Texas.
- Wells, Jacob D., cor. Fourteenth street and Central avenue, Cincinnati, Ohio.
- Wells, John C., cor. Allyn and High streets, Hartford, Conn.
- Wells, Romanta, New Haven, Conn.
- Wenck, George J., No. 381 Sixth avenue, New York.
- Wendel, Henry E., cor. Third and George streets, Philadelphia, Pa.
- Wendler, Robert, No. 414 Atlantic avenue, Brooklyn, N. Y.
- Wenzel, William T., cor. Fourth and Howard streets, San Francisco, Cal.
- Westerfield, Joseph H., No. 170 William street, New York.
- Weusthoff, O. S., Dayton, Ohio.
- Whall, Joseph S., No. 82 Hancock street, Quincy, Mass.
- Wharton, John C., No. 88 Union street, Nashville, Tenn.
- Wharton, William H., No. 38 Union street, Nashville, Tenn.
- Wheeler, C. Gilbert, University of Chicago, Chicago, Ill.
- Wheeler, Lucian F., Waldo, Fla.*

- White Aaron S., No. 59 High street, Mt. Holly, N. J.
- White, Philip A., No. 102 Gold street, New York.
- Whitfield, Thomas, No. 240 Wabash avenue, Chicago, Ill.
- Whiting, Frederick T., Main street, Great Barrington, Mass.
- Whitman, Nelson S., No. 8 Merchants' Exchange, Nashua, N. H.
- Whitney, Henry M., cor. Essex and Lawrence streets, Lawrence, Mass.
- Wickham, William H., No. 91 Fulton street, New York.
- Wiegand, Thomas S., No. 528 Arch street, Philadelphia, Pa.
- Wienges, Conrad, cor. Coles and Fourth streets, Jersey City, N. J.
- Wigert, Carl R., No. 213 Jefferson street, Burlington, Iowa.
- Wike, Albert D., No. 8 Market street, Marietta, Pa.
- Wilcox, Frederick, Waterbury, Conn.
- Wild, Joseph O., Holyoke, Mass.
- Wilder, Graham, No. 181 Main street, Louisville, Ky.
- Wilder, Hans M., 209 East Twenty-third street, New York.
- Wilkins, Daniel G., No. 11 Charles street, Boston, Mass.
- Williams, John K., No. 891 Main street, Hartford, Conn.
- Williamson, E. J., Ninth and Franklin streets, St. Louis, Mo.
- Willis, Joseph N., No. 327 East Franklin street, Richmond, Va.
- Wilson, Adam H., cor. Dauphin and Cedar streets, Philadelphia, Pa.
- Wilson, Benjamin O., No. 18 and 20 Central street, Boston, Mass.
- Wilson, Julius H., No. 189 Maxville street, Chicago, Ill.
- Wilson, William, New York.
- Wingate, Jeremiah Y., No. 11 Central Building, Somersworth, N. H.
- Winkleman, John H., cor. Liberty and German streets, Baltimore, Md.
- Winslow, Edwin C., Danville, Ill.
- Winslow, Samuel W., No. 38 Kingston street, Boston, Mass.
- Winter, Jonas, No. 81 West Franklin street, Hagerstown, Md.
- Witte, Edward, No. 4128 Broadway, St. Louis, Mo.
- Wohlfarth, Justin, 2002 Third avenue, New York.
- Wolfe, Nathaniel, Wilkesbarre, Pa.
- Woltersdorf, Louis, No. 171 Blue Island avenue, Chicago, Ill.
- Wood, Alonzo F., No. 2 Church street, New Haven, Conn.
- Wood, Edward S., Boston, Mass.
- Wood, Theodore Bell, Lexington, Ky.
- Woodbridge, George W., No. 2 Faneuil Hall Square, Boston, Mass.
- Woodruff, Roderick S., No. 91 Bank street, Waterbury, Conn.
- Woodward, Samuel M., No. 91 North Charles street, Baltimore, Md.
- Worthington, J. Willits, Main street, Moorestown, N. J.
- Wright, Archibald W., cor. Front and Market streets, Philadelphia, Pa.
- Wright, William R., No. 88 Kingston street, Boston, Mass.
- Wynn, William, No. 496 Fulton street, Brooklyn, N. Y.
- Yeakel, Nathan, Lafayette, Ind.
- Yonge, St. John R., Savannah, Ga.
- Yorston, Matthew M., No. 429 Central avenue, Cincinnati, O.
- Young, Alexander N., No. 103 Sixteenth street, Wheeling, W. Va.
- Young, John E., No. 8 Sherman's Block, Vergennes, Vt.
- Zeilin, John H., No. 512 Cherry street, Philadelphia, Pa.
- Zellhoefer, George, No. 91 Fulton street, New York.
- Ziegler, Philip M., No. 526 Penn street, Reading, Pa.
- Zoeller, E. V., Tarboro, N. C.
- Zwick, George G., cor. Eleventh and Meridian streets, Covington, Ky.

LIST OF DECEASED MEMBERS.

HONORARY MEMBERS.

		Elected.	Died.
Bache, Franklin, M D.,	Philadelphia, Pa.,	1857	1864
Bailey, Montgomery J., M.D.,	New York,	1856	1878
Boullay, Pierre, François Guillaume,	Paris, France,	1868	1869
Casselmann, Arthur, Ph.D.,	St. Petersburg, Russia,	1868	1872
Chevallier, Alphonse, M.D.,	Paris, France,	1871	1879
Deane, Henry,	London, England,	1868	1874
Durand, Elias,	Philadelphia, Pa.,	1857	1878
Farrington, Thomas,	Boston, Mass.,	1856	1867
Hanbury, Daniel,	London, England,	1868	1875
Ludwig, Hermann, Ph.D.,	Jena, Germany,	1871	1873
Mohr, Frederick, Ph.D.,	Bonn, Germany,	1868	1879
Robinet, Stéphane,	Paris, France,	1868	1869
Wiggers, H. August L., Ph.D.,	Göttingen, Germany,	1877	1880
Wood, George B., M.D.,	Philadelphia, Pa.,	1857	1878

ACTIVE MEMBERS.

		Elected.	Died.
Aimar, George Washington,	Charleston, S. C.,	1874	1877
Anderson, James H.,	New York,	1859	1866
Andrews, George W. (Pres. 1856-57),	Baltimore, Md.,	1856	1877
Aspinwall, James S.,	New York,	1855	1874
Atwood, Charles Henry,	Boston, Mass.,	1856	1877
Bache, Charles L.,	San Francisco, Cal.,	1852	1854
Backus, James W.,	Marine City, Mich.,	1867	1870
Badger, Charles William,	Newark, N. J.,	1870	1877
Balmer, James,	Baltimore, Md.,	1856	1866
Barry, John W.,	Baltimore, Md.,	1856	1861
Baylis, William E. P.,	Brooklyn, N. Y.,	1860	1872
Baynon, John,	Shreveport, La.,	1858	1862
Beam, Isaac R.,	Baltimore, Md.,	1878	1879
Bell, Gotthold E.,	Louisville, Ky.,	1874	1879
Benzinger, John Sylvester,	Baltimore, Md.,	1860	1869
Bertolett, William J.,	Shreve, O.,	1872	1877

		Elected.	Died.
Bidwell, Marshall Spring,	Elmira, N. Y.,	1871	1877
Bigelow, Francis O.,	Medford, Mass.,	1859	1868
Billings, Samuel J.,	New York,	1860	1865
Bingham, John C.,	St. Johnsbury, Vt.,	1858	1870
Blair, Henry C.,	Philadelphia, Pa.,	1855	1862
Blauw, Hippolyt A.,	Rochester, N. Y.,	1856	1870
Bowman, Henry K.,	Philadelphia, Pa.,	1869	1878
Boyden, Ashel,	Boston, Mass.,	1853	1877
Bright, James Evesson,	Worcester, Mass.,	1868	1872
Bringham, Ferris,	Wilmington, Del.,	1862	1871
Brown, John T.,	Boston, Mass.,	1859	1860
Brown, William,	Boston, Mass.,	1858	1875
Canavan, Benjamin,	New York, N. Y.,	1855	1857
Carney, Charles Tibbetts,	Boston, Mass.,	1853	1862
Caspari, Charles,	Baltimore, Md.,	1856	1870
Chapman, William B. (Pres. 1854-55),	Cincinnati, O.,	1852	1874
Cherot, Leonce,	Memphis, Tenn.,	1865	1879
Churchill, George W.,	Chelsea, Mass.,	1865	1869
Clency, William F.,	Cincinnati, O.,	1859	1865
Coddington, Isaac,	New York, N. Y.,	1855	1874
Colby, Moses D.,	Boston, Mass.,	1859	1870
Coon, Walter S.,	New York, N. Y.,	1858	1861
Coppuck, Peter V.,	Mount Holly, N. J.,	1857	1869
Cressman, Noah,	Waterloo, Canada West,	1863	1864
Cunningham, James E.,	Pittsburg, Pa.,	1860	1863
Cushman, Alexander,	New York, N. Y.,	1858	1861
Daggett, Alfred, Jr.,	New Haven, Conn.,	1865	1878
Davies, Robert J.,	Brooklyn, N. Y.,	1858	1872
De Motte, Henry A.,	Jersey City, N. J.,	1871	1873
D'Evers, Henry Gaston,	Chicago, Ill.,	1865	1870
Dodge, John P.,	New York, N. Y.,	1865	1863
Dunk, Alfred A.,	East Saginaw, Mich.,	1867	1879
Easterbrook, Ray B.,	New York, N. Y.,	1858	1868
Ellis, Charles (Pres. 1857-58),	Philadelphia, Pa.,	1852	1878
Emanuel, Louis M.,	Linwood, Pa.,	1857	1868
Everson, John C.,	Philadelphia, Pa.,	1863	1872
Eyster, Christopher Edward,	Yankton, Dak.,	1871	1877
Fish, George B.,	Saratoga Springs, N. Y.,	1860	1866
Fish, Henry F.,	New York, N. Y.,	1852	1868
Foley, J. T.,	Houston, Tex.,	1878	1879
Folger, William Swain,	Boston, Mass.,	1875	1878
Forester, Richard,	Brooklyn, N. Y.,	1860	1862
Frohwein, Max,	New York, N. Y.,	1865	1877
Fulton, John Culpepper P.,	Brooklyn, N. Y.,	1873	1874
Gabaudan, Arthur W.,	New York, N. Y.,	1862	1870
Gaither, Francis S.,	Washington, D. C.,	1860	1876
Gay, William,	Cambridgeport, Mass.,	1858	1862

LIST OF DECEASED MEMBERS.

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		Elected.	Died.
Geiger, Conrad J.,	Canton, O.,	1866	1876
Gerhard, John C.,	Cincinnati, O.,	1862	1866
Geyer, Andrew,	Boston, Mass.,	1853	1855
Gilman, Samuel K., Jr.,	Boston, Mass.,	1876	1879
Gleeson, Michael H.,	Boston, Mass.,	1859	1879
Goodwin, William W.,	Newburyport, Mass.,	1853	1877
Graefle, Frederick Alexander,	Baltimore, Md.,	1870	1878
Griswold, William H.,	North Adams,	1874	1879
Groneweg, Louis,	Cincinnati, O.,	1864	1866
Harbaugh, Valentine,	Washington, D. C.,	1856	1871
Hassard, Peter J.,	Philadelphia, Pa.,	1853	1876
Hegeman, Frederick Augustus,	New York, N. Y.,	1855	1860
Hegeman, William,	New York, N. Y.,	1858	1875
Henchman, Daniel,	Boston, Mass.,	1853	1878
Hensch, Hugo,	Cleveland, O.,	1872	1878
Hendel, Samuel D.,	St. Louis, Mo.,	1858	1871
Heydenreich, Frederick V.	Brooklyn, N. Y.,	1860	1879
Hill, Henry E.,	Detroit, Mich.,	1866	1868
Hollis, Thomas,	Boston, Mass.,	1853	1875
Hommann, James W.,	New York, N. Y.,	1875	1875
Howard, George M.,	Washington, D. C.,	1871	1877
Hughes, Henry Arnold,	Louisville, Ky.,	1857	1876
Hunt, Henry H.,	Balston Spa, N. Y.,	1876	1877
Jardella, Jerome B.,	Vincennes, Ind.,	1865	1870
Jenkins, William Ellis,	Boston, Mass.,	1865	1869
John, Frederick L.,	Philadelphia, Pa.,	1856	1864
Johnston, Charles P.,	Memphis, Tenn.,	1868	1873
Junghanns, Charles A.,	Cincinnati, O.,	1858	1862
Keffer, Frederick A.,	New Orleans, La.,	1862	1873
Kennedy, Robert C.,	Cleveland, O.,	1865	1868
Kent, Ashbury,	Cincinnati, O.,	1854	1860
Kent, William,	Cincinnati, O.,	1864	1867
Kidder, Darius B.,	Boston, Mass.,	1858	1874
King, Alexander,	Buffalo, N. Y.,	1874	1876
King, Henry,	New York, N. Y.,	1858	1867
Knapp, Edwin E.,	Norwalk, Conn.,	1860	1862
Kolp, Christopher Henry,	Philadelphia, Pa.,	1876	1878
Krummeck, Jacob,	Santa Fé, New Mexico,	1867	1878
Laidley, Joseph,	Richmond, Va.,	1852	1861
Lancaster, Thomas A.,	Philadelphia, Pa.,	1859	1875
Lane, James B.,	Fitchburg, Mass.,	1856	1867
Leitch, Alexander,	St. Louis, Mo.,	1858	1868
Lineaweaver, Kline Cyrus,	Washington, D. C.,	1864	1873
Lingelbach, Ferdinand,	Louisville, Ky.,	1874	1879
Little, William B.,	Panama, U.S. Colombia,	1857	1867
Longshaw, William, Jr.,	Bayou Sara, La.,	1858	1864
Lyman, Benjamin,	Montreal, Can.,	1875	1878

		Elected.	Died.
Lyon, Charles H., Jr.,	Boston, Mass.,	1858	1871
McBride, James,	St. Louis, Mo.,	1864	1871
McConville, Michael S.,	Worcester, Mass.,	1859	1873
McDonald, John,	Brooklyn, N. Y.,	1860	1861
McIntyre, Timothy C.,	Washington, D. C.,	1858	1862
McPherson, George B.,	Cincinnati, O.,	1867	1871
Mallinckrodt, Gustavus,	St. Louis, Mo.,	1869	1877
Massott, Eugene L.,	St. Louis, Mo.,	1857	1871
Matt, Joseph,	Columbus, O.,	1872	1874
Mattern, Jonathan C.,	Pittsburg, Pa.,	1860	1876
Maxwell, James T.,	New York, N. Y.,	1855	1860
Mayer, Ferdinand F.,	New York, N. Y.,	1859	1869
Meakim, John (Pres. 1855-56),	New York, N. Y.,	1852	1863
Melzar, Augustus P.,	Wakefield, Mass.,	1856	1874
Merrick, John M.,	Boston, Mass.,	1875	1879
Metcalf, Tristram W.,	Brooklyn, N. Y.,	1857	1873
Milhau, John (Pres. 1867-68),	New York, N. Y.,	1855	1874
Muller, William H.,	Chicago, Ill.,	1865	1870
Nagle, John G.,	Baltimore, Md.,	1863	1869
Nairn, Joseph Wilson,	Washington, D. C.,	1858	1875
Nadand, James W.,	Cincinnati, O.,	1864	1868
Norgrave, Samuel K.,	Pittsburg, Pa.,	1857	1871
Oliffe, William J.,	New York, N. Y.,	1858	1866
O'Brien, Joseph C.,	Baltimore, Md.,	1863	1873
Osgood, Samuel W.,	Davenport, Iowa,	1858	1860
Palmer, Albert G.,	Washington, D. C.,	1858	1860
Parker, Herschel,	Brooklyn, N. Y.,	1867	1870
Parrish, Edward (Pres. 1868-69),	Philadelphia, Pa.,	1852	1872
Peck, Samuel P.,	Bennington, Vt.,	1853	1859
Pettis, Newton C.,	North Adams, Mass.,	1868	1874
Philbrick, Samuel R.,	Boston, Mass.,	1852	1859
Phillips, Lewellyn,	Baltimore, Md.,	1856	1865
Platzer, Robert,	Philadelphia, Pa.,	1865	1874
Polhemus, James L.,	Sacramento, Cal.,	1866	1867
Pollard, Charles P.,	Marysville, Cal.,	1859	1869
Porter, Henry C.,	Towanda, Pa.,	1869	1877
Preston, Alfred, Jr.,	Portland, Me.,	1873	1879
Procter, William, Jr. (Pres. 1862-63),	Philadelphia, Pa.,	1852	1874
Pyle, J. Lindley,	Brooklyn, N. Y.,	1859	1866
Rehfuss, Lewis,	Cincinnati, O.,	1854	1856
Reifsnider, William E.,	Baltimore, Md.,	1864	1872
Reinold, Bernard H.,	New York, N. Y.,	1861	1876
Rideout, James W.,	Brooklyn, N. Y.,	1875	1880
Ritson, Alfred,	Columbus, O.,	1870	1879
Roberts, David,	Boston, Mass.,	1858	1863
Rollmann, Frederick,	Philadelphia, Pa.,	1862	1864
Roemer, Daniel,	Cincinnati, O.,	1865	1870

		Elected.	Died.
Sands, Jesse M.,	New York, N. Y.,	1860	1867
Schmidt, Henry,	New York, N. Y.,	1874	1875
Schmidt, William George,	Louisville, Ky.,	1874	1877
Scott, David,	Worcester, Mass.,	1855	1878
Scott, John,	Cincinnati, O.,	1854	1878
Scully, Harmar D.,	Pittsburg, Pa.,	1858	1866
Smith, Charles Augustus,	Cincinnati, O.,	1852	1862
Smith, Edward A.,	Baltimore, Md.,	1870	1875
Smith, Edwin R.,	Monmouth, Ill.,	1862	1869
Smith, James W.,	Norfolk, Va.,	1878	1876
Smith, Samuel A.,	Newburyport, Mass.,	1859	1874
Squire, William H.,	Germantown, Pa.,	1862	1865
Stabler, Richard H. (Pres. 1870-71),	Alexandria, Va.,	1856	1878
Steiner, Henry,	Philadelphia, Pa.,	1857	1858
Stephens, William G.,	Yonkers, N. Y.,	1860	1878
Stevens, Ashbel Mead,	Cincinnati, O.,	1854	1860
Stevens, Rufus Walker,	Somersworth, N. H.,	1859	1868
Suding, Henry A.,	Baltimore, Md.,	1870	1875
Sweetser, Thomas Augustus,	South Danvers, Mass.,	1859	1860
Taylor Robert James,	Newport, R. I.,	1859	1871
Taylor, William,	Philadelphia, Pa.,	1868	1871
Thomas William,	Jersey City, N. J.,	1856	1856
Tully, Andrew J.,	New York, N. Y.,	1862	1875
Uhl, Charles,	Memphis, Tenn.,	1860	1878
Waite, Samuel B.,	Washington, D. C.,	1858	1862
Warren, Charles Henry,	Brandon, Vt.,	1872	1876
Warren, William,	Brighton, Mass.,	1867	1871
Watson, William J.,	Brooklyn, N. Y.,	1858	1872
Weyman, George W.,	Pittsburg, Pa.,	1858	1864
White, Daniel F.,	Charlestown, Mass.,	1859	1864
White, William P.,	Chicago, Ill.,	1865	1866
Whitehead, Silas,	Lynchburg, Va.,	1856	1858
Willard, Joseph,	Chicago, Ill.,	1865	1878
Wilson, George C.,	Boston, Mass.,	1859	1861
Wiseman, Charles,	Baltimore, Md.,	1856	1862
Witzell, Louis,	Cincinnati, O.,	1864	1867
Wood, G. Davidge,	Baltimore, Md.,	1856	1868
Woods, Samuel H.,	Boston, Mass.,	1859	1869
Wright, George,	New York, N. Y.,	1869	1878

LIST OF RESIGNATIONS.

Names.	Residence.	Elected.
†Buck, John T.,	Jackson, Miss.,	1868
‡Chadwick, Alexander B.,	Brooklyn, N. Y.,	1872
‡Christian, Theodore,	Washington, D. C.,	1873
‡Cole, Theodore,	New York, N. Y.,	1873
‡Cotton, William H.,	Newport, R. I.,	1875
†Doolittle, Erastus H.,	Boston, Mass.,	1865
†Fickardt, George H.,	Circleville, O.,	1864
‡Imhof, Henry,	New York, N. Y.,	1872
‡Jarrett, Henry T.,	New York, N. Y.,	1875
†Littlefield, Alvah,	Boston, Mass.,	1856
‡Massenberg, Thomas,	Macon, Ga.,	1878
‡Pfeiffer, Adolph,	St. Louis, Mo.,	1876
‡Pickford, Thomas,	Wallingford, Conn.,	1875
‡Price, Charles S.,	Washington, D. C.,	1876
‡Redfearn, John,	Fall River, Mass.,	1873
‡Schwab, Louis,	Cincinnati, O.,	1876
†Smith, Albert C.,	Boston, Mass.,	1875
‡Stoddard, George H.,	Cambridge, Mass.,	1877
†Williams, Joseph,	London, Ont.,	1875

LIST OF MEMBERS DROPPED FROM THE ROLL.

Names.	Residence.	Elected.
Babcock, James F.,	Boston, Mass.,	1875
Burgess, Edward,	Norfolk, Va.,	1876
Clough, Thomas R.,	Medford, Mass.,	1875
Close, Edward W.,	Unknown,	1874
Cochran, Samuel W.,	Camden, N. J.,	1876
D'Amour, Otto,	St. Louis, Mo.,	1876
Dame, Samuel P.,	Sharon, Pa.,	1876
Glenn, Thomas J.,	St. Louis, Mo.,	1878
Harrop, Joseph W.,	Leavenworth, Kan.,	1869
Hickling, Daniel P.,	Washington, D. C.,	1867
Ink, Parker P.,	Washington, Iowa,	1872
Kidwell, John L.,	Washington, D. C.,	1856

† Left the business.

‡ No reason given.

† Inability to attend the meetings.

LIST OF MEMBERS DROPPED FROM THE ROLL.

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Names.	Residence.	Elected.
Levering, Henry W.,	Jersey City, N. J.,	1876
Nowell, William F.,	Boston, Mass.,	1855
Palmer, Hosea W.,	Chicago, Ill.,	1870
Parker, Joseph L.,	Boston, Mass.,	1864
Primm, Hubert,	St. Louis, Mo.,	1856
Scars, George T.,	Boston, Mass.,	1875
Talbot, James S.,	Boston, Mass.,	1873
Taber Edward M.,	Washington, D. C.,	1874
Thieneman, Charles,	Baltimore, Md.,	1876
Torrey, Charles E.,	Syracuse, N. Y.,	1876
Underhill, Charles P.,	Norfolk, Va.,	1876
Walker, John A.,	Caledonia, Ont.,	1873
Warren George W ,	Boston, Mass.,	1875
Willard William H.,	Worcester, Mass.,	1875
Yeomans, Lewis W.,	Belleville, Ont ,	1876

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1 gal
259 +

